# FIRE SAFE CIGARETTES

4. EN 2/3: 103-130

e Safe Cigarettes, Serial No. 10...

## ARING

EFORE THE

SUBCOMMITTEE ON
COMMERCE, CONSUMER PROTECTION, AND
COMPETITIVENESS

OF THE

COMMITTEE ON
ENERGY AND COMMERCE
HOUSE OF REPRESENTATIVES

ONE HUNDRED THIRD CONGRESS

SECOND SESSION

ON

**H.R. 3885**

A BILL TO DIRECT THE CONSUMER PRODUCT SAFETY COMMISSION TO PROMULGATE FIRE SAFETY STANDARDS FOR CIGARETTES

APRIL 20, 1994

**Serial No. 103–130**

Printed for the use of the Committee on Energy and Commerce

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# FIRE SAFE CIGARETTES

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## WEDNESDAY, APRIL 20, 1994

House of Representatives,
Committee on Energy and Commerce,
Subcommittee on Commerce, Consumer Protection,
and Competitiveness,
*Washington, DC.*

The subcommittee met, pursuant to notice, at 10:20 a.m., in room 2123, Rayburn House Office Building, Hon. Cardiss Collins (chairwoman) presiding.

Mrs. Collins. Good morning. This hearing of the Energy and Commerce Subcommittee on Commerce, Consumer Protection, and Competitiveness will come to order.

Today we are considering legislation introduced by Congressman Joe Moakley to require the cigarette industry to produce cigarettes less likely to cause furniture or mattress fires. Congressman Moakley's bill, the Fire Safe Cigarette Act of 1994, H.R. 3885, would require the Consumer Product Safety Commission to develop a mandatory fire safety standard for cigarettes to reduce the likelihood that cigarettes would ignite upholstered furniture and mattresses.

The bill is a response to two previous Federal studies completed in 1987 and 1993 showing that such a study is feasible and could reduce the large death, injury, and property damage toll from cigarette-caused fires. Nevertheless, the cigarette industry has strongly opposed legislation in this area.

But several weeks ago the Justice Department's Antitrust Division confirmed it was investigating the possibility of an illegal conspiracy among cigarette companies to suppress research and development of fire-safe cigarettes, and more recently CBS's 60 Minutes revealed internal Philip Morris documents going back a number of years showing that Philip Morris apparently knows how to make fire-safe cigarettes that are acceptable to smokers.

The bill would prevent many needless fires and save many innocent lives, but the Flat Earth Society people from the tobacco industry, the same people who still say smoking doesn't cause cancer, will oppose this important initiative. They will claim they don't know how to do it or that smokers won't smoke fire-safe cigarettes, or, most ironic of all, they will even express concern that fire-safe cigarettes might be more toxic than regular cigarettes. But the documents revealed by 60 Minutes show a very different picture.

In short, the subcommittee must ask why the arguments by the cigarette industry against this bill deserve any more credibility than the industry's discredited arguments that smoking doesn't cause cancer.

The cigarette fire toll is sizable. Cigarette fires accounted for a quarter of all residential fire deaths in 1990, cigarettes started an estimated 44,000 structural fires that caused about 1,200 deaths, 3,360 civilian injuries, and $400 million in direct property loss.

Unfortunately, my home city of Chicago has been famous, or infamous, for fire ever since Mrs. O'Leary's cow knocked over a lighted lantern in 1871. In 1991, the Cook County medical examiner recorded 118 residential fire deaths. Between 1984 and 1993, there were 23 fatal cigarette fires in Illinois. These resulted in 64 deaths and 37 injuries including injuries to 4 firefighters, and in 6 of these fires 4 or more people died.

Fire disproportionately affects African Americans and the poor. Per capita, African Americans have significantly higher fire-related death rates than either whites or the national average. According to the Centers for Disease Control, black children are 3 times more likely to die in a residential fire than white children, and according to the Consumer Product Safety Commission's recent study of cigarette fires, families with an income of less than $10,000 a year were 6 times as likely to have a cigarette fire as those with an annual income of $20,000 or more. We must make every effort to prevent these tragic fires.

Congressman Moakley has been the leader on this issue and deserves enormous credit for his persistent efforts, and I am pleased to begin the effort to enact this bill that he has authored with today's hearings.

103D CONGRESS
2D SESSION

# H. R. 3885

To direct the Consumer Product Safety Commission to promulgate fire safety standards for cigarettes, and for other purposes.

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IN THE HOUSE OF REPRESENTATIVES

FEBRUARY 23, 1994

Mr. MOAKLEY introduced the following bill; which was referred to the Committee on Energy and Commerce

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# A BILL

To direct the Consumer Product Safety Commission to promulgate fire safety standards for cigarettes, and for other purposes.

*Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,*

## SECTION 1. SHORT TITLE, FINDINGS.

(a) SHORT TITLE.—This Act may be cited as "Fire Safe Cigarette Act of 1994".

(b) FINDINGS.—The Congress finds that—

(1) cigarette ignited fires are the leading cause of fire deaths in the United States,

(2) in 1990 there were 1,200 deaths from cigarette ignited fires, 3,360 civilian injuries from such

fires, and $400 million in property damage caused by such fires,

(3) over 100 children are killed each year from cigarette related fires,

(4) the results accomplished under the Cigarette Safety Act of 1984 and the Fire Safe Cigarette Act of 1990 complete the necessary technical work for a cigarette fire safety standard,

(5) it is appropriate for the Congress to require by law the establishment of a cigarette fire safety standard for the manufacture and importation of cigarettes,

(6) the most recent study by the Consumer Product Safety Commission found that the cost of the loss of human life and personal property from not having a cigarette fire safety standard is $4,000,000,000 a year, and

(7) it is appropriate that the regulatory expertise of the Consumer Product Safety Commission be used to implement a cigarette fire safety standard.

### SEC. 2. CIGARETTE FIRE SAFETY STANDARD.

(a) IN GENERAL.—Not later than one year after the date of the enactment of this Act, the Consumer Product Safety Commission shall by rule issue a cigarette fire safety standard for cigarettes to reduce the risk of ignition presented by cigarettes. In establishing the standard the Commission shall—

(1) consult with the National Institute of Standards and Technology and make use of its capabilities as it deems necessary and seek the advice and expertise of other Federal and State agencies engaged in fire safety, and

(2) take into account the final report to the Congress made by the Commission and the Technical Advisory Group established under section 3 of the Fire Safe Cigarette Act of 1990 in which it was found that cigarettes with a low ignition propensity are already on the market.

(b) STOCKPILING.—The Commission shall include in the rule issued under subsection (a) a prohibition of stockpiling of cigarettes to which the standard issued under subsection (a) will not apply. For purposes of this subsection, the term "stockpile" means the manufacturing or importing of a cigarette between the date a standard is issued under subsection (a) and the date the standard is to take effect at a rate greater than the rate the cigarettes were manufactured or imported for the one year period ending on the date the standard was issued.

(c) PROCEDURE.—The rule under subsection (a) shall be issued in accordance with section 553 of title 5, United States Code.

(d) EFFECTIVE DATE.—The Commission shall prescribe the effective date of the rule issued under subsection (a), except that such date may not be later than 2 years after the date of the enactment of this Act.

(e) JUDICIAL REVIEW.—

(1) GENERAL RULE.—Any person who is adversely affected by a rule issued under subsection (a) may, at any time before the 60th day after the Commission issues the rule, file a petition with the United States Court of Appeals for the District of Columbia Circuit or for any other circuit in which such person resides or has its principal place of business to obtain judicial review of the rule. A copy of the petition shall be forthwith transmitted by the clerk of the court to the Secretary. The Commission shall file in the court the record of the proceedings on which the Commission based the rule as provided in section 2112 of title 28, United States Code.

(2) ADDITIONAL EVIDENCE.—If the petitioner applies to the court for leave to adduce additional evidence, and shows to the satisfaction of the court that such additional evidence is material and that

there was no opportunity to adduce such evidence in the proceeding before the Commission, the court may order such additional evidence (and evidence in rebuttal thereof) to be taken before the Commission in a hearing or in such other manner, and upon such terms and conditions, as the court deems proper. The Commission may modify the Commission's findings as to the facts, or make new findings, by reason of the additional evidence so taken, and the Commission shall file such modified or new findings, and the Commission's recommendations, if any, for the modification of the rule.

(3) COURT JURISDICTION.—Upon the filing of a petition under paragraph (1), the court shall have jurisdiction to review the rule of the Commission, as modified, in accordance with chapter 7 of title 5, United States Code.

## SEC. 3. ENFORCEMENT.

(a) PROHIBITION.—No person may manufacture or import a cigarette unless the cigarette is in compliance with a cigarette fire safety standard issued under section 2(a).

(b) PENALTY.—A violation of subsection (a) shall be considered a violation of section 19 of the Consumer Product Safety Act.

## SEC. 4. PREEMPTION.

(a) In General.—This Act and the cigarette fire safety standard promulgated under section 2(a) do not preempt or otherwise affect in any way any law of a State or political subdivision which prescribes a fire safety standard for cigarettes which is more stringent than the standard promulgated under section 2(a).

(b) Defenses.—In any civil action for damages compliance with the fire safety standard promulgated under section 2(a) may not be admitted as a defense.

## SEC. 5. DEFINITIONS.

For purposes of this Act:

(1) The term "Commission" means the Consumer Product Safety Commission.

(2) The term "cigarette" has the meaning prescribed by section 3 of the Federal Cigarette Labeling and Advertising Act.

○

Mrs. COLLINS. Mr. Stearns.

Mr. STEARNS. Thank you, Madam Chairwoman.

We meet today to hear testimony on H.R. 3885, the Fire Safe Cigarette Act of 1994. H.R. 3885 would direct the Consumer Product Safety Commission to develop a consumer product safety standard with the objective of reducing the risk that cigarettes will ignite clothing, furniture, or other similar materials.

After the Commission completes a standard, all cigarettes sold in the United States would have to be so-called "fire-safe" cigarettes. The bill's intent is noble, to save lives by making it more difficult for cigarettes to start fires, and I commend Chairman Moakley for his continuing attention to this important issue of public safety. But I am very concerned about the means used to achieve these ends.

Today we will hear about the results of a second study to determine the feasibility of developing a fire-safe cigarette. After expending almost $3 million on a study mandated by Congress in 1990, the CPSC concluded that while it may be feasible to develop such a cigarette, it is unclear that it would have any effect on the number of cigarette-ignited fires. Further, no matter how feasible development of a fire-safe cigarette, the Commission felt that it was not the proper agency to issue such a standard.

H.R. 3885 appears to ignore these findings. In addition, H.R. 3885 short-circuits the traditional CPSC rule-making process as structured in the CPSC's authorizing statutes.

Although most consumer product safety standards take between 5 and 7 years to develop, the bill before us requires that the Commission issue the rule 1 year after enactment. There are real questions about whether the CPSC can develop a standard for fire-safe cigarettes that adequately considers possible effects of the toxicity of cigarette smoke, let alone whether it can do so within 1 year.

Further, CPSC's resources have been steadily dwindling, and I have great concern about giving the Commission new responsibilities if there is little chance that they will have the additional resources needed to handle the existing responsibilities. What will the Commission have to give up in the area of consumer product safety to pursue fire-safe cigarettes?

My second reservation about the bill is that it mandates that the Commission issue the standard under the Administrative Procedures Act rather than the Consumer Product Safety Act or the Federal Hazardous Substances Act.

I have voiced my concerns in the past about bypassing CPSC's authorizing statutes. These laws would not be on the books if Congress did not believe that agencies should follow them.

Proponents of this approach will claim that since Congress is mandating that the CPSC perform this rule-making, they should use the streamlined process available under the APA. Unfortunately, by taking this approach, the Commission is relieved of the responsibility of meeting the test presented in the Consumer Products Safety Act. These tests include things like, one, whether the costs reasonably match the benefits; two, whether voluntary standards might meet the objectives of this rule-making as well or better than a mandatory consumer product safety standard; and three, whether the mandatory standard is reasonably necessary to reduce an unreasonable risk of injury.

In those cases where Congress has chosen to have the CPSC use the APA for issuing rules, it has generally been in those areas where Congress actually writes the standard into the statute, and the CPSC is only required to implement, interpret, and enforce this standard. That is not so with H.R. 3885.

This hearing represents another step in the chairwoman's continuing commitment to the safety of consumer products, particularly when the lives of children are involved. Chairman Moakley has also shown a deep commitment to this issue and should be recognized for his dedication. However, their dedication does not eliminate our obligation as legislators to ask these tough questions. Is this a problem about which something can and needs to be done? Is the CPSC the right agency for the job? If it is, why are we bypassing all the Commissions authorizing statutes?

I look forward to hearing from our witnesses today and hope that they will take the time to address these questions in their testimony.

Thank you, Madam Chairwoman.

Mrs. COLLINS. Thank you.

Mr. Greenwood.

Mr. GREENWOOD. Thank you.

I want to commend the chairwoman for holding this hearing. Certainly if there is something that we can do to reduce the risks associated with cigarette smoking and particularly reduce the victimization of innocent bystanders like children in a home consumed by flames from a cigarette, we will have done something worth doing.

I also would note, though, that I am on the Health Subcommittee. Last week we had a hearing on the toxicity of cigarettes and what a Hobson's choice it would be if we had to choose between making cigarettes that are less likely to start fires but more toxic versus cigarettes that are less toxic and more likely to start fires.

So I look forward to hearing from the experts to learn whether we really can do this.

Thank you.

Mrs. COLLINS. Our first witness today is the Honorable John Joseph Moakley who is the author of the legislation.

We are delighted to have you before our subcommittee today and will take great note of your testimony. You may begin at this time, please.

## STATEMENT OF HON. JOHN JOSEPH MOAKLEY, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF MASSACHUSETTS

Mr. MOAKLEY. Thank you, Madam Chairwoman and members of the committee.

I think maybe to frame the issue better, if it is all right with the committee, we have excerpts of the 60 Minutes show that brought to my committee evidence that we didn't even have.

Mrs. COLLINS. Without objection, so ordered.

[Videotape shown.]

Mr. MOAKLEY. Madam Chairwoman, I think that the piece you just saw and the members saw probably frames the question better than I could, and the information and evidence that Mr. Wallace showed was the first time that I had seen some it. He said that he got it from inside Philip Morris, and I would just have to take his word for that.

But I would like to put the issue in perspective. Deaths from cigarette-related fires are not an uncommon occurrence. Since I started working on this issue 15 years ago, more than 20,000 people have been killed by these fires. Many of the victims are not smokers but innocent children and babies. In this day and age where we have improved safety requirements for automobiles, banned unsafe toys, and issued flammability standards for children's pajamas, there is just no rationale for not imposing safety regulations on cigarettes. Simply, Madam Chairwoman and members, the time has come to end this ludicrous practice of exempting cigarettes from Federal regulation.

As most of my colleagues know, I became involved in this issue in 1979 when a carelessly disposed cigarette was responsible for the death of an entire family in my congressional district. Five children all under the age of ten were burned to death. Eleven years later, another cigarette-related fire killed a family of six in Boston, and this tragic fire killed three children under the age of three. And after that 1979 fire in my district, Madam Chairwoman, I introduced legislation calling for the self-extinguishing cigarette, and as you may guess, the tobacco industry adamantly opposed this legislation on the basis that it just couldn't be done.

I was not deterred by the industry's opposition and initial skepticism. In 1984 after intense negotiations with the tobacco industry, the Cigarette Safety Act was enacted into law. The legislation created a technical study group to assess the feasibility of developing such a cigarette. The study group concluded that it was technically and economically feasible and may be commercially feasible to develop a fire-safe cigarette.

Shortly thereafter I introduced legislation calling for the Consumer Product Safety Commission to promulgate a fire safety standard for cigarettes. Again, the tobacco industry opposed the legislation. They claimed that this type of cigarette just would not be commercially feasible.

After years of delaying the measure, the cigarette companies came forward and worked with me to pass legislation that called for the technical work to be completed by the National Institute of Standards and Technology, and, as you know, Madam Chairwoman in 1993, NIST, the National Institutes of Standards and Technology, developed a very reliable and a very valid test method to determine the ignition propensity of cigarettes. They also concluded that five brands of cigarettes on the marketplace are currently fire safe. These currently are Virginia Slims Super, More, More White Lights, Capri Light and Eve Light.

Interestingly enough, each cigarette company has a cigarette that would reduce fires and is acceptable to consumers.

As a result of these findings, I introduced the most recent legislation, H.R. 3885, which would direct the Consumer Product Safety Commission to promulgate fire safety standard for cigarettes, and the legislation would give the cigarette companies 1 year to comply with the performance standard.

We are all aware that the Justice Department now is investigating whether the cigarette companies had a gentleman's agreement to withhold these cigarettes from the marketplace. I have seen internal documents that make it perfectly clear that some companies have a fire-safe cigarette that is now acceptable to consumers, and after working on this issue and bending over backwards to be fair, we shouldn't have to settle for anything less than making all cigarettes in the marketplace fire safe.

There are many reasons that this legislation is absolutely necessary. First, too many people are killed and permanently disfigured from cigarette-related fires. Very simply, we have the technology to prevent these tragedies from occurring, we just need the political will. No family should have to endure the suffering, pain, and anguish that the young family in my congressional district did.

These fires take a considerable toll on society, and a recent study concluded that the direct cost of cigarette-ignited fire deaths, injuries, and property damage was $4 billion a year. A mandatory fire standard would significantly reduce these costs to society, and in terms of health care costs alone the savings would be enormous.

As we continue to deliberate this issue, we will hear arguments in opposition to this legislation. I urge my colleagues on the subcommittee to weigh the arguments that will be made against this legislation carefully and thoughtfully and to measure the legitimacy of those arguments against the fact that over 1,200 people are killed and countless more are permanently disfigured from cigarette-related fires.

Let me tell you just some of the arguments I have heard. First, cigarette manufacturers have made continuous and unsubstantiated claims that the test method does not accurately predict the behavior of cigarettes in real world conditions and that some cigarettes would actually show reversals in the ignition propensity. As you all know, I am not a scientist, but my 1990 legislation called for the NIST Building and Fire Research Laboratory to develop the test method. I chose NIST because they employ the best fire safety experts in the country, and I have had assurances that this test method was as good as any other test method that is used today.

The other argument that may be put forward is that a fire-safe cigarette would not be acceptable to consumers. I have always said that it is the cigarette manufacturers' responsibility and not the Government's to develop a cigarette that consumers will smoke, but the recent documents I have seen suggest that back in 1987 one company conducted consumer acceptability tests and found that there were no significant differences between the test cigarette and commercial cigarettes.

Another argument that may be raised is the health toxicity issue. Some say that the modifications made to make a cigarette fire safe would significantly increase the biological activity of cigarettes and actually make them worse that cigarettes in the marketplace today. Well, I certainly don't want to see fire-safe cigarettes that have higher levels of tar and nicotine than current cigarettes, but we know that cigarette manufacturers already have fire-safe cigarettes in the marketplace that have the same level of tar and nicotine as other commercial cigarettes.

The bottom line is that the cigarette manufacturers have the ability to put a fire-safe cigarette into the marketplace. There are five cigarettes already in the marketplace that would significantly reduce fire, and each of the five cigarette companies has a fire-safe cigarette. So they have proven without a doubt that it is commercially feasible, and more than ever Congress needs to act quickly to move my legislation forward.

Some may say why rush? I say it is because it is a matter of life and death.

Madam Chairwoman, as you know, I didn't get on the "ban cigarettes" bandwagon, this bill was filed originally 15 years ago. It is not a bill to do away with smoking, it is just a bill to do away with setting people on fire that do happen to smoke, and I know that you yourself have had an interest in this matter, and I would hope that this bill would be passed this year in order that we can get on with saving lives of those that don't even smoke.

[Testimony resumes on p. 26.]

[The prepared statement and attachments of Mr. Moakley follow. Certain additional attachments are retained in the record files of the subcommittee.]

# TESTIMONY
# BY
# CONGRESSMAN JOE MOAKLEY

Thank you for holding hearings on the Fire Safe Cigarette Act of 1994. I appreciate your interest and willingness to address an issue that is a top priority of mine.

First let me put this issue in perspective for you. Deaths from cigarette related fires are not an uncommon occurrence. Since I started working on this issue 15 years ago, more than 20,000 people have been killed by these fires. Many of the victims are not smokers but innocent children and babies.

In this day and age when we have improved safety requirements for automobiles, banned unsafe toys, and issued flammability standards for children's pajamas there is no rationale for not imposing safety regulations on cigarettes. Simply, it's intolerable -- THE TIME HAS COME TO END THIS LUDICROUS PRACTICE OF EXEMPTING CIGARETTES FROM FEDERAL REGULATION.

As most of my colleagues know, I became involved with this issue in 1979 when a fire caused by a carelessly discarded cigarette killed a entire family in my Congressional District. Five children - all under the age of ten - were burned to death. Eleven years later, another cigarette related fire killed a family of six in Boston. This tragic fire killed three children all under the age of three.

Cigarette related fires are not flukes or rare occurrences. In 1990, there were 44,000 of these fires. They occur in all Congressional Districts, not just mine. Last year in New York, a new year's eve blaze killed four children, ages 8, 6, 2, and 1. The three story fire began when a woman who had been drinking fell asleep on the couch, and accidently dropped her lit cigarette onto a couch. She awoke later and not realizing that the cigarette was smoldering went upstairs to sleep. Later, the cigarette ignited the couch, which burned rapidly and spread throughout the house rapidly. The deaths of these small children -- who were the innocent victims of a careless smoker -- could have been prevented.

In North Carolina, four family members died, and three were injured when a fire began in the living room chair of a three bedroom cinder block home. Two children, ages 1 and 11 were killed. The Chief Fire Investigator described "the scenario as typical," he continued, "You have a party. People come in. They'll of course be sitting around smoking. It is easy for ash to get flipped onto a couch. Those things can smolder for hours and then burst into flames." This scenario doesn't need to be typical. In fact, this fire as well as many others could have been prevented if my legislation calling for a fire safety standard for cigarettes was enacted.

After the 1979 fire in my District, I introduced legislation calling for a self-extinguishing cigarette. As you may guess, the tobacco industry adamantly opposed this legislation on the basis that it just couldn't be done. I was not deterred by the industry's opposition and initial skepticism. In 1984, after intense negotiations with the tobacco industry, the Cigarette Safety Act was enacted into law. The legislation created the Technical Study Group to assess the feasibility of developing such a cigarette.

The study group, chaired by Dick Gann, the foremost expert on fire safety, made its recommendations to Congress in 1987. The study group concluded that it was technically and economically feasible, and may be commercially feasible to develop a fire safe cigarette. Shortly thereafter, I introduced legislation calling for the Consumer Product Safety Commission to promulgate a fire safety standard for cigarettes. Again, the tobacco industry was opposed to the legislation. They claimed that this type of cigarette would not be commercially feasible.

After years of delaying the measure, the cigarette companies came forward and worked with me to pass legislation that called for the technical work to be completed by the National Institute of Standards and Technology.

As you know, in 1993, NIST developed a very reliable and valid test method to determine the ignition propensity of cigarettes. They also concluded that five brands of cigarettes in the marketplace are fire safe. The cigarettes are Virginia Slims Super, More, More White Lights, Capri Light, and Eve Light. Interestingly enough, each cigarette company has a cigarette that would reduce fires and is acceptable to consumers.

As a result of these findings, I introduced my most recent legislation. H.R. 3885 would direct the Consumer Product Safety Commission to promulgate fire safety standards for cigarettes. The legislation would give the cigarette companies one year to comply with the performance standard.

Opponents of the legislation may say that the time frame is too stringent and would put cigarette companies out of business. My legislation is not an attempt to put cigarette companies out of business. In fact, I am not anti-smoking. I have said all along that my main goal is to reduce cigarette related fires and the deaths and disfigurement attributed to these fires. But it angers me to no end to think that these companies have had the ability to produce such a cigarette and haven't taken responsible action.

I would like to reiterate that I have worked on this issue for 15 years and it pains me greatly to think that cigarette manufacturers have had the ability to make fire safe cigarettes and have resisted. Innocent children are being burned to death because of their continuous delays and inaction.

We are all aware that the Justice Department is investigating whether the cigarette companies had a gentleman's agreement to withhold these cigarettes from the marketplace. I have seen internal documents that make it perfectly clear that some companies have a fire safe cigarette that is acceptable to consumers. After working on this issue for fifteen years and bending over backwards to be fair, I am not going to settle for anything less than making all cigarettes in the marketplace fire safe.

There are many reasons why this legislation is absolutely necessary. First and foremost, too many people are killed or permanently disfigured from cigarette related fires. Very simply, we have the technology to prevent these tragedies from occurring. We just need the political will. No family should have to endure the suffering, pain and anguish that young family in my Congressional District did.

These fires take a considerable toll on society. A recent study concluded that the direct cost of cigarette ignited fire deaths, injuries, and property damage was $4 billion a year. A mandatory fire safety standard would significantly reduce these costs to society. In terms of health care costs alone the savings would be enormous. Treatment for burn injuries is the most expensive type of medical care today. These fires disproportionately impact the low income and the elderly - those who have no means of paying the hospital bill. Thus, a fire safety standard would significantly reduce health care costs - particularly medicare and medicaid.

As we continue to deliberate this issue we will hear arguments in opposition to my legislation. I urge my colleagues on the Subcommittee to weigh the arguments that will be made against this legislation carefully and thoughtfully, and to measure the legitimacy of those arguments against the fact that over 1200 people are killed and countless more are permanently disfigured from cigarette related fires.

Let me tell you about some of the arguments I have heard. First, cigarette manufacturers have made continuous and unsubstantiated claims that the test method does not accurately predict the behavior of cigarettes under real world conditions and that some cigarettes would actually show reversals in ignition propensity. As my colleagues know, I am not a scientist but my 1990 legislation called for NIST's Building and Fire Research Laboratory to develop the test method. I chose NIST because they employ the best fire safety experts in the country. I have assurances that this test method is as good as any other test method used today.

The other argument, that may be put forward is a fire safe cigarette would not be acceptable to consumers. I have always said that it is the cigarette manufacturers responsibility, not the government's, to develop a cigarette that consumers will smoke. But the recent documents I have seen, suggest that in 1987, one company conducted consumer acceptability tests and found that there was no significant difference between the test cigarette and the commercial cigarettes. The fact that cigarette companies continue to raise the consumer feasibility issue seven years after their testing occurred is particularly disturbing to me. Especially, since hundreds of innocent children and babies are being burned to death.

Another argument that may be raised is the health toxicity issue. Some may say that the modifications made to make a cigarette fire safe would significantly increase the biological activity of cigarettes and actually make them worse than cigarettes in the marketplace today. Well, I certainly don't want to see fire safe cigarettes that have higher levels of tar and nicotine than current cigarettes. But we know that cigarette manufacturers already have fire safe cigarettes in the marketplace that have the same levels of tar and nicotine as commercial cigarettes. My legislation does not ignore the issue as some representatives of cigarette companies may claim.

My legislation gives the authority to the CPSC to issue a performance standard. There are certain activities including setting minimal criteria for health toxicity that the CPSC will perform when they promulgate the standard.

My bottom line is that cigarette manufacturers have the ability to put fire safe cigarettes into the marketplace. There are five cigarettes already in the marketplace that will significantly reduce fire. Each of the five cigarette companies has a fire safe cigarette. They have proven without a doubt that it is commercially feasible. Now more than ever, Congress needs to act expeditiously to move my legislation forward. Some may say why rush, I say because it is a matter of life or death.

## FIDO incidents with at least 2 deaths or more 1984-1993

**California**

- There were 24 fatal cigarette fire incidents on file which resulted in 71 civilian deaths, nine civilian injuries, and eight fire fighter injuries.
- There were six fires in which 4 or more people died. The worst cigarette fire resulted in six deaths in one fire.

**Florida**

- NFPA has record of two fatal cigarette fire incidents in Florida that killed 2 or more people. Each of these fires resulted in two civilian deaths.

**Georgia**

- There were records of 11 fatal cigarette fire incidents in FIDO. These fires resulted in 26 civilian deaths, 10 civilian injuries and 2 fire fighter injuries.
- The worst multiple-death cigarette fire in Georgia of which NFPA is aware claimed four lives.

**Illinois**

- There were 23 fatal cigarette fire incidents in FIDO. These fires resulted in 64 civilian deaths, 33 civilian injuries, and four fire fighter injuries.
- In six of these incidents, four or more people died. The worst multiple-death fire involving cigarettes claimed six lives.

**Kansas**

- There were six fatal cigarette fires documented in FIDO in which 2 or more people died. Sixteen civilians died, two civilians were injured and one fire fighter was injured in these fires.
- Four of these fatal fires each resulted in 3 deaths.

**Michigan**

- There were twenty-two fatal cigarette fire incidents on file in which 66 civilians died, 34 civilians were injured and three fire fighters were injured.
- Based on FIDO documentation, five of these incidents resulted in four or more deaths. The worst multiple-death fire involving cigarettes resulted in ten fatalities.

**New Jersey**

- There were 13 fatal cigarette fire incidents in which 45 civilians died,a fire fighter died, 18 civilians were injured, and four fire fighters were injured.
- FIDO included six fatal cigarette fires that resulted in four or more deaths, two of these fires resulted in six deaths.

**New York**

- In FIDO, there were 28 fatal cigarette fire incidents on file which resulted in 89 civilian deaths, 40 civilian injuries and 32 fire fighter injuries.
- There were 11 cigarette fires with 4 or more deaths in each fire.

**North Carolina**

- There were 11 fatal cigarette fire incidents documented in FIDO. These fires resulted in 39 civilian deaths, 1 civilian injury and three fire fighter injuries.
- Six of these cigarette fires each resulted in four or more deaths.

**Pennsylvania**

- There were 32 fatal cigarette fire incidents on file. These fires resulted in 105 civilian deaths, one fire fighter death, 47 civilian injuries, and 20 fire fighter injuries.
- FIDO included 10 cigarette fires that each resulted in four or more deaths. The worst multiple-death cigarette fire in FIDO claimed 10 lives.

**INSIDE:**
**JUSTICE**

Washington Post 3/10/94

# Fire-Safe Cigarettes?

## *U.S. Smoking Out Opponents of Product*

By Michael J. Sniffen
Associated Press

The Justice Department is investigating whether tobacco companies illegally agreed not to produce or sell cigarettes that are less likely to start fires.

Justice Department spokeswoman Gina Talamona said this week that "the antitrust division is conducting an investigation into the possibility of agreement among cigarette companies to suppress product research and development regarding fire-safe cigarettes."

Vic Han, a spokesman for Philip Morris Cos., said there has been "absolutely no suppression" of such products.

Talamona said the department has issued civil investigative demands, which are the equivalent of subpoenas in the division's civil antitrust investigations. But she would not say what companies had received them or discuss details of the investigation.

Andrew McGuire of the Trauma Foundation in San Francisco, which lobbies for fire-safe cigarettes, said the investigation appears to have begun about four months ago.

McGuire said fire-safe cigarettes are feasible but that tobacco companies have resisted marketing them because "they don't want the fallout of product liability lawsuits over burn deaths and burn injuries caused by their current cigarettes."

Peggy Carter of Reynolds Tobacco in Winston-Salem, N.C., said the company acknowledged existence of the Justice Department investigation in a footnote to a recent stock filing with the Securities and Exchange Commission. She said SEC rules prevented her from commenting further.

THE WASHINGTON POST

In New York, Han said, "I can confirm that Philip Morris USA has received a civil investigative demand from the antitrust division . . . in an investigation of possible joint activity among United States manufacturers in the production and sale of cigarettes including possible joint activities to limit new product development, specifically in the area of reduced ignition propensity cigarettes."

There were 1,220 deaths, 3,358 injuries and $400 million in property damage from 44,000 cigarette-ignited fires in 1990, the most recent year with complete data, according to the Center for Fire Research of the government's National Institute of Standards and Technology.

A campaign to persuade the tobacco companies to produce fire-safe cigarettes was begun in 1978 by McGuire's Trauma Foundation, which seeks to prevent injuries and injury-related deaths. The trauma organization, which is supported by foundation grants and funds from the federal Centers for Disease Control and Prevention, is located in San Francisco General Hospital.

"There's no doubt the industry has known for a long time how to make fire-safe cigarettes and hasn't done it," said Northeastern University law professor Richard Daynard of the Tobacco Projects Liability Project, "because if a really safe cigarette is available that would open the companies to lawsuits over the ones that aren't safe."

Asked to comment on the government's investigation and the longstanding charges of suppression, Walker Merryman of the Tobacco Institute, an industry group, said, "Anything having to do with litigation is something we never comment on."

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# 5 Brands Found Less Likely to Start Fires

Tests conducted by the National Institute of Standards and Technology (NIST) show that five brands of cigarettes—More White Light 120s, More 120s, Virginia Slims Superslims 100s, Capri Light 100s and Eve Light 120s—are less likely to start fires.

The cigarettes were identified by NIST researchers while conducting ignition propensity tests for the Consumer Product Safety Commission. The Washington Post obtained the brand names through a Freedom of Information Act request.

NIST found that cigarettes with small circumferences, low-porous paper and low tobacco density were less likely to start fires in soft furnishings. The results and test methods were disputed by the Tobacco Institute, which said they don't meet "real-world" conditions.

"The brand names are only as good as the tests that were run. In the real world, that doesn't mean much," said Walker Merryman, a Tobacco Institute spokesman. "It may be interesting as a laboratory experiment, but it doesn't bring us any closer to conditions as they exist in the real world."

— Barbara Saffir

**INSIDE NIST**

WASHINGTON POST 1/6/94

# Where There's a Smoke ...

## *Congress Wants There to Be Less Fire*

By Barbara J. Saffir
Special to The Washington Post

Cigarettes do not have to cause fires as easily as they now do, according to a report recently released by the Consumer Product Safety Commission.

Studies conducted by the National Institute of Standards and Technology (NIST) for the CPSC concluded that not only is it technically and economically feasible to produce a less-ignition-prone cigarette, but also that five such commercial cigarettes exist.

Which ones, you ask?

The tobacco industry, which takes issue with many of NIST's findings, says it does not know. And the CPSC won't tell.

"Our legislation prohibits us from releasing the brand names," commission spokeswoman Bea Harwood said.

CPSC became involved when the Cigarette Safety Act of 1984, sponsored by Rep. Joe Moakley (D-Mass.) went into effect. Moakley introduced the measure after a devastating fire in Boston.

The law required NIST to conduct studies into whether it was commercially feasible to develop a cigarette less likely to ignite furniture and mattresses. It also called for the formation of a technical advisory panel of government researchers and experts from the tobacco industry, fire services and health groups to evaluate the studies.

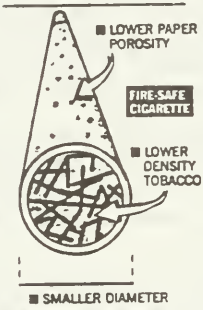
In 1990, after nearly three years and $2 million, NIST concluded that a less-ignition-prone cigarette could be produced but mass marketing such a product required more study.

Cigarettes are the leading cause of fire fatalities in the United States, although the numbers are declining. According to NIST, in 1990 25 percent of all residential fire deaths were due to cigarette-ignited fires. That year, cigarettes started 44,000 structural fires that caused 1,220 deaths, 3,358 civilian injuries and $400 million in direct property loss.

More recently, California officials said at least one of the devastating fires that burned out of control near Los Angeles last fall was started by a cigarette.

In 1990, the Fire Safe Cigarette Act mandated that the CPSC assess the practicality of a cigarette fire safety performance standard and develop a standard test method to determine the fire performance of cigarettes. It also required a field study of cigarette-related fires and whether a less-ignition-prone cigarette would be more toxic.

**A LESS IGNITION-PRONE CIGARETTE**



SOURCE: The National Institute of Standards and Technology

BY TOBEY—THE WASHINGTON POST

The $3 million study, concluded in 1993, confirmed the earlier studies and found that the cigarettes could be commercially produced and some were already on the market.

Last month, NIST researchers announced they had developed two tests that can be used to measure the ignition propensity of cigarettes. Researchers found that small circumference, low paper porosity and low tobacco density reduce the likelihood that cigarettes would start fires in soft furnishings.

"We ran thousands and thousand of ignition tests," said Richard G. Gann, chief of the fire science division in NIST's Building and Fire Research Laboratory.

"What was needed . . . was a reliable test that would accurately and consistently reflect what happens when cigarettes are dropped on furnishings," Gann said. "These simple tests are available to the cigarette industry now. They can form the basis for a possible performance standard, if lawmakers determine that is needed, and can assist the cigarette industry in adhering to possible standards and in testing for quality assurance."

NIST subjected various commercial and noncommercial or experimental cigarettes to two procedures: a mock-up ignition test and a cigarette extinction test.

The mock-up test measured whether an upholstery cushion covered with different weights of cotton duck fabric would ignite when a cigarette was placed on it. To pass the test, a cigarette either had to self-extinguish or burn in its entirety without starting a fire. In the extinction test, layers of filter paper were substituted for the cushion to determine whether the paper could absorb enough heat and extinguish itself.

NIST determined that both tests reliably measured the fire performance of cigarettes.

But the results were disputed by the Tobacco Institute, whose representatives accounted for four of the 15-member technical advisory panel members. They objected to the fabric choice and the tests. "The testing doesn't meet real-world conditions," Tobacco Institute spokesman Thomas Lauria said.

Within the next few weeks Moakley is expected to offer a bill supporting an industrywide cigarette ignition performance standard.

Although the Consumer Product Safety Commission's charter prohibits it from regulating cigarettes, the agency still may be asked to oversee the cigarette fire safety performance standard. But the agency seems reluctant to do so. Officials recently asked that Congress "identify and delegate to a more appropriate agency the task of working with industry to develop a performance standard."

## Section-by-Section Analysis of H.R. 3885

**by Mr. Moakley**

**(A bill to direct the Consumer Product Safety Commission to promulgate fire safety standards for cigarettes and for other purposes)**

### Section 1. Short Title, Findings.

Subsection (a) provides the short title of the bill, the "Fire Safe Cigarette Act of 1994."

Subsection (b) provides Congressional findings.

### Section 2. Cigarette Fire Safety Standard.

Subsection (a) requires the Consumer Product Safety Commission (CPSC) to issue, by rule, a fire safety standard for cigarettes, to reduce the risk of ignition presented by cigarettes, not later than one year after enactment. In establishing the standard, the CPSC is required to consult with the National Institute of Standards and Technology (NIST), make use of its capabilities as it deems necessary, and seek the advice and expertise of other Federal and state agencies engaged in fire safety. The CPSC shall also take into account the final report to the Congress made by the CPSC and the Technical Advisory Group established under section 3 of the Fire Safe Cigarette Act of 1990, in which it was found that cigarettes with a low ignition propensity are already on the market.

Subsection (b) requires the CPSC to include in the rule a prohibition of stockpiling, or the manufacturing or importing of cigarettes between the date the standard is issued and the date the standard takes effect at a rate greater than the rate in the one year period before the standard was issued.

Subsection (c) specifies the procedure the CPSC is to follow in issuing the rule. In particular, the rule is to be issued in accordance with section 553 of title 5, the notice and comment rulemaking procedures of the Administrative Procedure Act.

Subsection (d) provides that the CPSC shall prescribe the effective date of the rule, except that the effective date may not be later than two years after the date of enactment.

Subsection (e) specifies the procedure for judicial review of the rule issued by the Commission.

### Section 3. Enforcement.

Subsection (a) prohibits the manufacture or import of a cigarette unless the cigarette is in compliance with the fire safety standard issued by the CPSC.

Subsection (b) provides that a violation of subsection (a) shall be considered a violation of section 19 of the Consumer Product Safety Act, relating to unlawful prohibited acts.

## Section 4. Preemption.

Subsection (a) provides that this Act and the cigarette fire safety standard promulgated by the Commission do not preempt or otherwise affect any law of a State or political subdivision which prescribes a fire safety standard for cigarettes more stringent than the standard promulgated by the Commission.

Subsection (b) provides that in any civil action for damages, compliance with the fire safety standard promulgated by the Commission may not be admitted as a defense.

## Section 5. Definitions.

Section 5 provides definitions of "Commission" and "cigarette". The "Commission" means the CPSC, while "cigarette" has the meaning prescribed by section 3 of the Federal Cigarette Labeling and Advertising Act.

Mrs. COLLINS. Thank you.

Mr. MOAKLEY. We had a witness that was supposed to testify, but because of the change in date she couldn't make it, Barbara Kammerer Quayle, director of the Center of Imagine Enhancement and School Reentry Program. I would like to submit it for the record.

Mrs. COLLINS. Without objection, it will be submitted into the record.

[The prepared statement of Ms. Quayle follows:]

## STATEMENT OF BARBARA KAMMERER QUAYLE

Thank you, Chairwoman Collins, for inviting me here this morning to express my personal views in support of H.R. 3885, the "Fire Safe Cigarette Act of 1994." I would like also to thank Congressman Moakley for his 15 years of dedicated work that will, I hope, now lead to the regulation of cigarettes as a fire hazard and, thus, significantly reduce the annual toll of burn deaths and burn injuries caused by cigarettes. Clearly, it is long past due.

My support and interest in H.R. 3885 is both personal and professional. Although I was not burn-injured in a cigarette-caused fire, I have experienced the physical and emotional suffering that the severely burned endure. My professional interest is in two areas. First, I provide counseling and support for adults and children who suffer the pain and challenge of disfigurement and disability from a burn injury. This includes working with adults and children who have been burned in cigarette-caused fires. For example, I provide long-term guidance and assistance to burn-injured children who return to school after spending months in a burn center. The "reentry" into school and society is a delicate and, often painful transition. I try to make that experience less painful. Second, I am a 12 year member of the American Burn Association (ABA) and have served on the ABA's Prevention and Rehabilitation Committees. The ABA is the professional medical organization for all those who are involved in burn prevention, treatment, and rehabilitation in America. And, the ABA provided a representative who sat on the Technical Study Group and the Technical Advisory Group. Therefore, I bring to these hearings the concerted pleading from America's burn surgeons, nurses, physical therapists, occupational therapists, psychiatrists, psychologists, social workers—the entire burn team—that Congress act to put an end to senseless, needless and preventable burns caused by cigarettes.

It should be noted that since the first Cigarette Safety Act was introduced by Congressman Moakley in 1979, at least 20,000 men, women and children have died in cigarette-caused fires and an additional 50,000 men, women and children have been burn-injured in cigarette-caused fires. These injuries result in staggering human and financial costs. After hospitalization, 30 percent do not survive. Those who do survive have three times the overall average hospital stay. The daily cost of treating cigarette fire victims is ⅓ higher than the average for all burn center patients because they require intensive care for several weeks. This means the average cigarette fire admission consumes more than twice as many resources as other burn center patients at an average cost of over $100,000 per admission. These numbers project nationally to over 1,000 acute admissions with treatment costs of $100 million. This does not take into account the victims of lesser burns or inhalation injury only. These are not usually transferred to burn centers, nor are those who suffer traumatic injury escaping from cigarette fires. These make up the other 70 percent of the 3,500 injuries annually. These burn deaths and burn injuries represent a national horror story that is inexorably repeated day after day in America. Tragically, seldom are these stories reported on the evening news except for the typical story reporting that "Five children died in a cigarette-caused fire in the early hours of the morning." But the biggest story of all is that these are preventable burn deaths and burn injuries. Preventable only if we can gain passage of the Fire Safe Cigarette Act of 1994. I plead with you to help enact the Fire Safe Cigarette Act in order to stop the horror of cigarette-caused fires.[1]

Thank you, Chairwoman Collins, for letting me testify today. Again, thank you Congressman Moakley for all that you have done.

Mrs. COLLINS. Mr. Moakley, in my opening statement I referred to the documents revealed on 60 Minutes. The subcommittee became aware that the Consumer Product Safety Commission was provided those documents by 60 Minutes, and pursuant to the subcommittee's authority a copy of those documents was requested from the Commission. After consultation with the Department of Justice, the Commission provided those documents to our subcommittee. The documents are extremely relevant to this hearing and bear directly on the question of the feasibility of establishing a fire safety standard for cigarettes, the commercial feasibility of less ignition prone cigarettes, and the potential toxicity of such cigarettes. They reveal information that appears to contradict the stated position of the tobacco industry. It is essential that several of these documents be discussed at this hearing to properly understand the feasibility of your legislation and objections to it.

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[1] The Burn Foundation, Regional Registry, Philadelphia, PA.

Congressman Moakley, I believe you have two documents which are probably familiar to you from your appearance on 60 Minutes. These two documents are from Philip Morris's Project Hamlet file. Project Hamlet has been Philip Morris's effort to develop a lower ignition potential cigarette. One is an April 29, 1987, Philip Morris memo, and the other is a revision of that memo dated June 9, 1987. We have copies of those here.

I believe the April 29 version that was shown on the recent 60 Minutes telecast is the one that we are particularly interested in. The documents reveal a test of 2 cigarettes among 77 smokers. One cigarette appears to be a regular control cigarette while the other is a test cigarette presumably of lower ignition propensity, although Philip Morris now apparently claims otherwise.

The question is, what has the tobacco industry told you about the acceptability to smokers of lower ignition propensity cigarettes, Congressman Moakley?

Mr. MOAKLEY. They said that they couldn't guarantee they could do it without increasing the nicotine and tar, and they had not at that time been able to produce a fire-safe cigarette that would be acceptable to consumers.

Mrs. COLLINS. Well, do you happen to know—you do know about the test itself. Could you share with the subcommittee the results of the test that we have reference to?

Mr. MOAKLEY. Well, actually there are experts here that could talk about the test because these documents were not gotten by me through regular channels, and I would rather have the people who have worked on the studies like Dick Gann and others who are experts in their fields to answer those questions.

Mrs. COLLINS. In the Hamlet file—and you make mention of it in your opening testimony on page 5—you mention, but the recent documents I have seen suggested in 1987 one company conducted consumer acceptability tests and found that there was no significant difference between the test cigarette and the commercial cigarettes.

Mr. MOAKLEY. The chairwoman is correct.

Mrs. COLLINS. And then when I look at the test—the information from the tests that they did and the 1987 report, the confidential report that Philip Morris did, they say right in that report, "The cigarette models appear to be equally acceptable to the smokers in this test."

Mr. MOAKLEY. Yes.

Mrs. COLLINS. And you agree with that?

Mr. MOAKLEY. I agree with that.

Mrs. COLLINS. OK.

So would you say that the industry assertion is apparently incorrect when they say that they can't make a cigarette that would be acceptable to the public?

Mr. MOAKLEY. I would say, if you compare their statement with the written statement, that they are misleading us, yes.

Mrs. COLLINS. One of the key purposes of your previous legislation, that is, the Fire Safety Cigarette Act of 1990, was to develop a test method to measure ignition potential of cigarettes, and the method developed by the National Institute of Science and Technology was approved by an 11 to 4 vote of the technical advisory group, is that right?

Mr. MOAKLEY. That is true.

Mrs. COLLINS. And the four dissenters were the industry representatives. Is that right?

Mr. MOAKLEY. Yes. The vote was—someone alluded to that they couldn't get a majority vote. It was 11 to 4 by the NIST group, and then when it went to the board it was two to one opposed.

Mrs. COLLINS. OK. Now let's discuss excerpts from this document which appears to be from the 1982—April 19, 1982, document. That is over 12 years ago. I am going to quote from one sentence there. It says—and I am quoting part of this—it says, "Careful attention to detail has allowed us to be successful in lending the furniture mock-up test to be a useful procedure for measuring differences in the ignition propensity of cigarettes." The memo also noted that the rationale for the test was "the apparent advantage of the system to simulate real world situations."

My question then becomes, does that sound like Philip Morris may have developed a test method way back in 1982?

Mr. MOAKLEY. The gentlelady is correct.

Mrs. COLLINS. You have been a tireless campaigner for fire-safe cigarettes, Congressman, and you have long argued that this is not an impossible task. You certainly are not alone in this belief as even some in the cigarette industry have shared that view for a number of years, as this document shows.

You see the internal Philip Morris memo which said back in January of 1977 with respect to the development of commercially feasible fire-safe cigarettes, "This does not appear to be an impossible task."

My question then is, why in the world has the industry been so resistant?

Mr. MOAKLEY. Well, as I say, they do have cigarettes that would conform to what is considered a fire-safe cigarette in the market now, and it may be a very difficult advertising event to show that they have some cigarettes that are fire safe, so by that it would be showing that there are a lot of cigarettes that aren't fire safe, and maybe it would be setting up some kind of a legal liability on them for allowing these type of cigarette to be on the market.

Mrs. COLLINS. Let me just raise one final concern that I have, which is the CPSC budget and its ability to absorb additional functions that has been mentioned by my ranking member, I believe. The CPSC chairman will shortly testify in support of this legislation but will also indicate that the cost of implementation of this legislation is going to be about $1.9 or $2 million over 18 months. Now that is a small cost in the context of the large benefits this bill is going to bring, but from the perspective of the CPSC budget that is a large cost, and I know there were similar concerns about the cost of the Fire Safety Cigarette Act in 1990, and you were instrumental in ensuring that the CPSC received the additional money it needed to carry out that Act, and I am wondering would you be willing to work with this subcommittee and the Appropriations Committee to help the CPSC fund the additional cost of this legislation?

Mr. MOAKLEY. Absolutely. In view of the new information that has been gathered, I just think that it can be done, and I think we would be penny wise and pound foolish if we didn't go ahead and carry out the mandate.

The new head of the CPSC is very interested in going along with it, and I understand that their budget has been cut severely, and I will do all in my power to see that this money would be put into the budget in order that they could complete the test.

Mrs. COLLINS. Wonderful. Thank you.

Mr. Stearns.

Mr. STEARNS. Thank you, Madam Chairwoman, and obviously I want to commend you for your efforts in this long period of time. You have been working on this longer than I have been in Congress, and I think for many people here——

Mr. MOAKLEY. In fact, when I talked with the tobacco industry, they said, "You know, in 15 more years"—this is about a month ago—"in 15 more years we may be able to do it." That is 30 years to come up with a remedy, you know, and I just think that is unconscionable to be asking for that kind of time.

Mr. STEARNS. For many of us on this side who have been to your committee as chairman of Rules Committee and had an opportunity to speak, we find it an opportunity to welcome you to this committee and also to commend you for what you are doing. I sort of feel like, many times I have been before your committee, that to have you come forward in strong efforts, that I certainly want to encourage you.

But I also want to bring out some questions here, and I think the question is, tobacco burns at a specific temperature, and this temperature is hot enough to ignite most fabrics at some point. I think the tobacco industry fears most of all that some sort of standard will be imposed that is impossible to meet, given the inherent nature of a cigarette and the burning temperature of tobacco.

Can you give the tobacco industry any assurance that it is not your intent for the Consumer Product Safety Commission to develop a standard that will have an effect of banning all cigarettes?

Mr. MOAKLEY. No. In fact, when I filed the bill originally, I said that this is not an anti-cigarette bill, this is an anti-burning bill. It has never been my intention. I don't smoke, but that doesn't mean that I am against everybody that smokes. If people feel like smoking, they are adults and they want to do it, that is fine. I have no objection to that.

My venture was to try to make these cigarettes as safe as possible, and when I find cigarettes on the market currently now that do it, I just wonder why they haven't applied it to all the cigarettes.

Mr. STEARNS. Your bill gives the Consumer Product Safety Commission 1 year to promulgate its rule.

Mr. MOAKLEY. Well, I say 1 year. If they say they need 2, that is fine, but by no means am I going to cave to the tobacco industry and give them 15 more years. I mean 30 years to develop a fire-safe cigarette is just ridiculous.

Mr. STEARNS. Yes. What is the sanction in your bill if they fail to meet the 1-year time limit?

Mr. MOAKLEY. No. As I say—I think I talked with the Consumer Product Safety Commission, and they think maybe it should be 18 months rather than a year. I have no problem with that.

Mr. STEARNS. Madam Chairwoman, I think that is the only questions I have.

It just sort of occurs to me that, of course, you know, matches are in the same situation in the sense that you could take matches and they create fires too. Have you looked at, you know, the comparison of other things that burn down here? I mean at some point you know, the Government would be regulating everything and anything with huge amounts of implementing regulation.

Mr. MOAKLEY. Well, I think that is going from one extreme to the other. You are now talking about a product that is not regulated at all. When four or five youngsters were seriously injured by those lawn dart games, the Consumer Product Safety Commission rushed right to the rescue and put them out of business.

Here is a situation that is killing hundreds of babies a year, people who don't even smoke. A match absolutely causes fires, but you just can't say you can't strike a match, but you can say something about a product that puts this torture on the market and it should be responsible, you know, the best way possible.

If they can construct a cigarette that burns with the least propensity for ignition like the five cigarettes that I mentioned—Eve, More 100's, and going down the line—it has been told to me by experts that it can be done. The papers from Philip Morris that the chairwoman read show that it can be done, and I don't know why it is not being done.

Mr. STEARNS. Thank you, Madam Chairwoman.

Mrs. COLLINS. Mr. Greenwood.

Mr. GREENWOOD. Thank you.

Just so I understand your position on this, you believe that, number one, the cigarette companies can manufacture cigarettes that have this low propensity for ignition. That is an established fact?

Mr. MOAKLEY. That is according to their own records.

Mr. GREENWOOD. Second, you believe the reason that they have not marketed those cigarettes or gone exclusively into manufacturing those cigarettes is because each of the companies who are in a very competitive market are afraid of losing market share. Is that what you believe is their motivation?

Mr. MOAKLEY. Well, that could be part of it, and this is just conjecture, but also if they say they can make a safe cigarette and they could have made it for 20 years, I believe they would be setting some liability up against themselves for not doing it.

Mr. GREENWOOD. I heard you make that statement earlier. So if that is the case, would you argue that they need this legislation to give them the mandate so that they can be, A, competitive, and B, avoid the legal liability of making some safe cigarettes and some cigarettes that are less safe?

Mr. MOAKLEY. I would like to see them do it by themselves on their own, but, you know, I have been filing legislation for 15 years and we don't seem to be much closer than we were then. I mean I admit that some of the tobacco industries have come around and are cooperating with the committee, but, you know, I just don't know we have the luxury of waiting for all the time that these people want to stretch it out.

Mr. GREENWOOD. What I am trying to get to is whether it is reasonable to expect manufacturers to go to a voluntary standard given a couple of points that have been raised here. One is that if they do it voluntarily and they make some cigarettes that have this low propensity to ignite and they manufacture other cigarettes that have a higher propensity, they may have a legal liability that is huge and, B, they are going to be scared to death about their competition.

So I guess what I want to ask you is, has the tobacco industry given you any indication that they would feel more comfortable being mandated to do this than they would doing it voluntarily?

Mr. MOAKLEY. No, I don't think any industry wants to be mandated to do anything. In fact, even the test that was provided by the National Institute, the tobacco industry quarreled with the test and said, "Well, it is not a real world test; you should do this." Then some of the tobacco industry people said, "Well, what you should do is fireproof this and fireproof that so that the cigarettes wouldn't ignite it." Well, that is great. I mean what if you want to carry out what the tobacco industry wants to do? We would fireproof the entire world so that no matter where you dropped a cigarette, it wouldn't ignite. But you know, that isn't feasible and it is not realistic, and when I talk to some of the people who are on the National Institute of Standards and Technology that voted 11 to 4 in favor of my proposal, I am convinced it can be done, and I just think that they don't need a lot of time to do it because of all the tests that have been done by the industry themselves and also by the technical groups.

Mr. GREENWOOD. We saw from the 60 Minutes piece that the most popular brands of cigarettes are the ones that are most likely to cause fires, and the brands that are most fire safe are among the less popular brands. So, if a cigarette company went to voluntarily make only fire-safe cigarettes, or at least safer cigarettes, they would lose a significant market share. If they were all required to live to the same standards, they would be on a level playing field with regard to consumers.

Mr. MOAKLEY. Well, I am for mandating them because I don't think they are going to do it on a volunteer basis.

Mr. GREENWOOD. Thank you.

Thank you, Madam Chairwoman.

Mrs. COLLINS. Mr. Paxon.

Mr. PAXON. Thank you very much.

Mr. Chairman, first of all, we very much appreciate your efforts and your leadership in this issue and commend you for pursuing it over such a long period of time. Just a couple of quick questions. I know we have a vote on, so I will try to be brief.

Your bill requires the Consumer Product Safety Commission to promulgate a rule governing cigarette ignition propensity, yet your bill directs CPSC to act under the Administrative Procedures Act and not under the Consumer Product Safety Act or the Federal Hazardous Substances Act, two of the Acts that CPSC administers that have rule-making sections. Why does your bill direct rule making under the APA and not the CPSA or the FHSA? Alphabet soup.

Mr. MOAKLEY. Yes. My legislation follows the Administrative Procedures Act which all other agencies follow, and the CPSC rule-making procedure just has extra hoops and requirements that I don't think are necessary in this matter here because of all the testimony and all the procedures that we have gone through to date.

Mr. PAXON. Mr. Chairman, one of the differences, as you know, between rule making under the CPSA and the APA is that under the CPSA the Commission is required to rely on voluntary standards rather than a rule and finds that compliance with the voluntary standards will adequately reduce the risk of injury and there will be substantial compliance with the voluntary standard. The APA requires no such finding. Why should CPSC be required to consider reliance on a voluntary standard for the rest of the products that it regulates but not the ignition propensity of cigarettes?

Mr. MOAKLEY. Well, I thought the CPSC would be the best agency to carry it out and especially with the new leader of that group that is really determined to get into this, allowing that she is funded properly, and every other group just doesn't seem to want to—nobody originally wants to touch this thing because it is a hot potato.

But I just think that the CPSC, from all the agencies that I looked at, would be the one that should do it, and we could change the rules and allow that.

Mr. PAXON. Mr. Chairman, one last question. In your testimony you note that—and I am quoting you here—"I have seen internal documents that make it perfectly clear that some companies have a fire-safe cigarette that is acceptable to consumers." Do you have in your possession those documents?

Mr. MOAKLEY. I have seen them, but I understand the committee has the documents.

Mr. PAXON. They are available to us? I didn't have them in my packet.

Thank you very much, Mr. Chairman.

Mr. MOAKLEY. If you want the names of the brands, I will go through them.

Mr. PAXON. I saw those in your testimony, but I haven't seen the documents themselves.

Mr. MOAKLEY. OK.

Mr. PAXON. Thank you, Mr. Chairman.

Mrs. COLLINS. Thank you very much.

As you know, we have a vote on, and we have to go over to vote. We want to thank you very much, Mr. Chairman, for appearing before our subcommittee, and we know that you are very sincerely concerned about this, and I will do all I can to be of help to you in any way that we can legally do it in this situation. Thank you.

Mr. MOAKLEY. Thank you very much. I thank the chairwoman and the committee for listening to my testimony.

Mrs. COLLINS. The subcommittee now is going to recess, and I understand there is going to be another immediate vote, so we will be back after the next vote and recess until then.

[Brief recess.]

Mrs. COLLINS. This hearing of the Energy and Commerce Subcommittee on Commerce, Consumer Protection, and Competitiveness will reconvene at this time.

Our next panel will be the Honorable Ann Brown, the chairwoman of the Consumer Product Safety Commission; Dr. Richard Gann, the chief of the Fire Science Division of the National Institute of Standards and Technology; and Mr. Donald R. Shopland, the coordinator for the Smoking and Tobacco Control Program for the National Cancer Institute.

Before calling on our first witnesses, we have an opening statement from a member of our subcommittee, Mr. Ed Towns, and I ask unanimous consent that his statement be made a part of the record.

Without objection, so ordered.

[The prepared statement of Mr. Towns follows:]

### STATEMENT OF HON. ED TOWNS

It is important that we make every effort to reduce the injuries and deaths caused by cigarette fires. Certainly, the persistent efforts of our colleague from Massachusetts have gone a long way toward bringing this issue to both the Congress and the general public. In that vein, I was pleased to hear that the chair of the consumer product safety commission shares my concerns about the importance of addressing the health effects of cigarette design. I believe that it is important that we simultaneously examine any toxicity problems which might result from changes in design to reduce ignition propensity.

I look forward to this hearing as an opportunity to resolve this issue and to reduce fires due to cigarettes.

Mrs. COLLINS. We are going to begin with you, Ms. Brown. You may begin at this time.

Ms. BROWN. Thank you, Madam Chairwoman and members of the subcommittee.

Mrs. COLLINS. Let me say before you begin that you know the regular procedure is that we work under the 5-minute rule of the subcommittee and that you may summarize your testimony—all of you, whoever the witnesses are going to be for the rest of the day—with the full knowledge that your full statements may be made a part of the record.

You may begin now.

## STATEMENTS OF HON. ANN BROWN, CHAIRMAN, CONSUMER PRODUCT SAFETY COMMISSION; RICHARD GANN, CHIEF, FIRE SCIENCE DIVISION, NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY; AND DONALD R. SHOPLAND, COORDINATOR, SMOKING AND TOBACCO CONTROL PROGRAM, NATIONAL CANCER INSTITUTE

Ms. BROWN. Yes, that is correct. Thank you.

I am Ann Brown, and I am chairperson of the Consumer Product Safety Commission, and I am pleased to testify in support of H.R. 3885.

This legislation would authorize the Commission to establish a mandatory performance standard for fire-safe cigarettes within 1 year after enactment. We would prefer 18 months. That would be preferable to our staff. The standard would become effective 2 years after enactment, under the bill.

In developing the standard, the Commission is directed to consult with the National Institute of Standards and Technology and to seek the advice and expertise of other relevant Federal and State agencies engaged in fire safety.

It may be argued by some that the Commission is attacking the wrong part of the problem, that we should impose standards on the mattress and upholstered furniture industries to make their products more fire resistant. The reality is, however, that the Commission has already taken these steps. A regulation to reduce cigarette-ignited mattress fires was imposed in the seventies. As a result, the number of these fires dropped by 50 percent between 1980 and 1991. Similarly, in the seventies the upholstered furniture industry, in response to CPSC concerns, developed a voluntary program to cut cigarette-ignited fires. These fire deaths decreased 59 percent between 1980 and 1991.

The Commission is now considering a petition to impose a mandatory flammability standard on upholstered furniture. The mattress and upholstered furniture industries have made a considerable contribution to the reduction in house fires. It is time for the cigarette industry to do its part.

Since both mattresses and upholstered furniture have years of use, it takes a long time for the impact of fire-resistant materials to show up in our statistics, but since cigarettes tend to be used quickly, advances in fire safety would become evident soon.

Since becoming chairman of the agency in March, I have reached different conclusions on the matter of whether we have the technical capability. A potential obstacle to development of a standard is the statement in the Commission's report to Congress which said that such an objective is beyond both the jurisdiction and the technical capability of the agency. That is really no longer the view of the Commission. The report also recommended, if Congress decided to pursue this goal, it should identify and delegate to a more appropriate agency the task of developing this standard.

First of all, I believe the Commission has the technical capability to carry out this assignment. We have worked closely with NIST for 10 years to advance the inquiry into the propensity of cigarettes to start household fires. For many years we have overseen mandatory and voluntary programs for both mattresses and upholstered furniture. As a result, we have gained expert knowledge of the factors which determine the ignition propensity of cigarettes.

Most of the CPSC staff which conducted the research under the 1984 and 1990 statutes are still at the agency. After meeting with them, I can assure you that CPSC has the capability to develop a reasonable standard for a fire-safe cigarette.

Second, I do not believe there is a more appropriate agency in the Federal Government than the CPSC to perform this work. The Commission was created more than 20 years ago as the agency to establish safety standards for consumer products. During this time we have prepared and implemented flammability regulations for many products including children's sleepwear. If a standard for a fire-safe cigarette is to be developed, the CPSC is the right agency to do it. In my view, it is the only agency that can do it.

A very important issue facing the Commission in developing the standard under this legislation is commercial acceptability. The tobacco industry has consistently argued that it does not have the technology to produce a substantially less ignition-prone cigarette that consumers will buy. However, CPSC-NIST tests show there are 5 brands currently on the market which are less likely to ignite a fire than the 14 top-selling brands, and of course we have seen the CBS 60 Minutes program. Philip Morris tested a less ignition-prone cigarette, and it tests favorably against a full-flavored control cigarette, a Marlboro.

There is further evidence of the industry's ability to produce a less ignition prone, commercially acceptable cigarette. In 1993, in June, a representative of one of the cigarette companies asked a member of the CPSC staff how the Commission would react if it were to unilaterally make certain changes in its products which would make them less likely to ignite a fire. This question was not a matter of idle curiosity. The company representative said he had been directed by senior executives to make the inquiry.

In recent days there has been another positive development that I want to share with you. One company contacted me and requested an opportunity to talk to the Commission about voluntary options in an effort to move forward constructively on the fire-safe cigarette issue. I welcome this initiative and plan to meet with this company. I will keep you informed of the progress the Commission makes toward the goal of getting a fire-safe cigarette to the market as soon as possible.

Perhaps the most difficult and important issue which the Commission must consider in developing a fire-safe cigarette is toxicity. Any fire-safe cigarette must be no more toxic than current brands, for, as the Commission recognized in its final report, even small increases in toxicity would counterbalance the beneficial effects of fewer household fires. For this reason, my staff and I have developed a comprehensive toxicity testing plan outlined in my full statement which will assure that any fire-safe cigarette is no more toxic than cigarettes currently on the market.

Madam Chairwoman, we have had great success with the children's sleepwear standard, and we heard the same arguments from the sleepwear industry as we are hearing now from the cigarette industry. With this example in mind, I urge you to approve this bill, and I am confident it will lead to fewer deaths, injuries, and less property damage from cigarette-ignited fires.

Thank you.

[Testimony resumes on p. 49.]

[The prepared statement of Ms. Brown follows:]

# TESTIMONY OF ANN BROWN
CHAIRMAN
U.S. CONSUMER PRODUCT SAFETY COMMISSION

SUBMITTED TO THE SUBCOMMITTEE ON COMMERCE, CONSUMER PROTECTION, AND COMPETITIVENESS

H.R. 3885, THE FIRE SAFE CIGARETTE ACT of 1994

April 20, 1994

Madam Chairwoman and members of the Subcommittee, I am Ann Brown, Chairman of the Consumer Product Safety Commission. I am pleased to testify in support of H.R. 3885.

At the outset, I want to commend Congressman Moakley for his leadership on this legislation. For more than a decade he has championed the cause of developing a less fire prone cigarette. Passage of this bill will be a tribute to his steadfast support of this cause.

The legislation would authorize the Commission to establish a mandatory performance standard for fire safe cigarettes within one year after enactment. The standard would become effective two years after enactment. In developing this standard the Commission is directed to consult with the National Institute of Standards and Technology and to seek the advice and expertise of other relevant Federal and State agencies engaged in fire safety.

After discussing this time table with the CPSC staff and Dr. Richard Gann of NIST, I recommend the Commission be given "up to 18 months" to develop the standard, with the effective date one year after the standard is promulgated. Although the Commission has done considerable research under the 1984 and 1990 Acts, I believe additional time will be required to establish a reasonable standard and complete the necessary toxicity testing.

Dr. Gann has addressed the issue of the technical feasibility of a more fire safe cigarette in his testimony. So I will not review the results of the NIST tests. Suffice to say the Commission is satisfied that reliable technology exists for the Commission to prepare the performance standard called for in the bill.

It may be argued by some that the Commission is attacking the wrong part of the problem, that we should impose standards on the mattress and upholstered furniture industries to make their products more fire resistant. The reality is however, that the Commission has already taken these steps. A regulation to reduce cigarette ignited mattress fires was imposed in the 70's. As a result, the number of these fire deaths dropped by 50 percent between 1980 and 1991, the latest year for which figures are available. Similarly, in the 70's the upholstered furniture industry, in response to CPSC concerns, developed a voluntary program to cut cigarette ignited fires. These fire deaths decreased by 59 percent between 1980 and 1991. The Commission is now considering a petition to impose a mandatory flammability standard on upholstered furniture.

The mattress and upholstered furniture industries have made a significant contribution to the reduction in house fires. It is time for the cigarette industry to do its part. Since both mattresses and upholstered furniture have years of use, it takes a long time for the impact of fire resistant materials to show up in our statistics. But since cigarettes tend to be used quickly, advances in fire safety would be evident soon.

I recognize that a potential obstacle to the Commission's undertaking the responsibility to develop a standard for a more fire safe cigarette is the statement in the Commission's report to the Congress last year that "such an objective is beyond both the jurisdiction and the technical capability of the agency." The report also recommended that if the Congress decides to pursue this goal, it should "identify and delegate to a more appropriate agency" the task of developing this standard.

Since becoming Chairman of the agency this year I have reached different conclusions on these matters. First, I believe the Commission has the technical capability to carry out this assignment. We have worked closely with NIST for 10 years to advance the inquiry into the propensity of cigarettes to start household fires. For many years we have also overseen mandatory and voluntary programs for both mattresses and upholstered furniture. As a result, we have gained expert knowledge of the factors which determine the ignition propensity of cigarettes.

Most of the CPSC staff which conducted the research under the 1984 and 1990 statutes are still at the agency. After meeting with them, I can assure you the CPSC has the capability to develop a reasonable standard for a fire safe cigarette.

Second, I do not believe there is a more appropriate agency in the Federal government than the CPSC to perform this work. The Commission was created more than 20 years ago as the agency to establish safety standards for consumer products. During this time we have prepared and implemented flammability regulations for many products including mattresses and upholstered furniture mentioned before, and children's sleepwear. If a standard for a fire safe cigarette is to be developed, the CPSC is the right agency to do it. In my view, it is the only agency that can do it.

A very important issue facing the Commission in developing the standard under this legislation is commercial acceptability. The tobacco industry has consistently argued that it does not have the technology to produce a substantially less ignition prone cigarette that consumers will buy. However, the CPSC/NIST tests showed there are five brands currently on the market which are much less likely to ignite a fire than the currently 14 top selling brands. They are MORE White Lights, MORE, Virginia Slims Super, Capri Light and Eve Lights. Moreover, as is now well known, the CBS News program 60 MINUTES produced at least anecdotal evidence that as early as 1987, Philip Morris had developed a less ignition prone cigarette which tested favorably against a "full flavored control cigarette" (a Marlboro) to a panel of 77 consumers.

There is further evidence of the industry's ability to produce a less ignition prone, commercially acceptable cigarette. In June 1993, a representative of one of the cigarette companies asked a member of the CPSC staff how the Commission would react if it were to unilaterally make certain changes in its products which would make them less likely to ignite a fire. This question was not a matter of idle curiosity. The company representative said he had been directed by senior executives to make the inquiry.

In recent days there has been another positive development that I want to share with you. One company has contacted me and requested an opportunity to talk to the Commission about voluntary options in an effort to move forward constructively on the fire-safe cigarette issue. I welcome this initiative and plan to meet soon with this company. I will keep you informed of the progress the Commission makes toward the goal of getting a fire safe cigarette to the market as soon as possible.

While all of this does not prove the tobacco companies currently have the capability to produce a commercially acceptable, more fire safe cigarette in all of the many varieties produced by the industry, it does indicate that at least some companies have developed substantial capabilities in this area. I believe passage of this bill will provide the final push necessary to encourage the companies to complete whatever remains to be done to market a more fire safe cigarette acceptable to consumers.

While the Commission has stated that it is practicable to develop a fire safe standard, and I believe it is appropriate for CPSC to undertake such development, such a standard is not available yet. In fact, much work remains to be completed before a standard could be promulgated. Although CPSC fully supports the test methods that NIST developed under prior Acts, those methods alone do not establish a standard. CPSC must weigh data collected from the testing of cigarettes with a wide range of other information before selecting a criterion for ignition propensity. This may include cost factors, if any, potential changes in toxicity, and consumer acceptance. In supporting passage of H.R. 3885, we recognize that some difficult work lies ahead to select a standard that will not only effectively reduce cigarette-ignited household fires, but will also withstand inevitable legal challenges. It is not a short or simple step from the NIST tests to a practicable standard for a fire safe cigarette.

Perhaps the most difficult and important issue which the Commission must consider in developing a fire safe cigarette is toxicity. Any fire safe cigarette must be no more toxic than current brands, for as the Commission recognized in its final report, even small increases in toxicity would counterbalance the beneficial effects of fewer household fires.

The 1990 Act imposed a limit of $50,000 for evaluating the health effects of a less ignition prone cigarette. So the Commission convened a panel of experts to develop a toxicological testing plan. These experts developed a comprehensive test plan which would cost at least $330,000 for completion of the tests on _each_ cigarette.

The Commission then contracted with two laboratories to conduct limited toxicity tests on five cigarettes--two commercial brands, two low ignition-potential prototypes, and a standard reference cigarette. The results indicated that this limited testing will provide data that can distinguish differences in toxicities among cigarette types. They also showed that the cost estimates of approximately $7,000 per cigarette were reasonable and the implementation of the first phase of the tests was feasible.

In order to minimize the costs of toxicity testing to the government, and provide reasonable assurance that toxicity is no greater than those in current cigarettes, I propose the following plan:

During the 18 months to be authorized by the bill, the CPSC shall consult with the Department of Health and Human Services to develop a set schedule of toxicity tests that would be administered, when the flammability standard became effective, by independent third party laboratories accredited under the National Voluntary Laboratory Accreditation Program. Under this program, the cigarette manufacturers would submit samples of their products to those laboratories for toxicity testing. The results would then be evaluated by a board of toxicological review, comprised of independent experts in the field chosen by the Commission. The companies would pay user fees to cover the costs of the laboratory analysis and the review board. Based upon the results of the testing, the board would make a judgement on the toxicity of the particular cigarette compared to those cigarettes now in use, within reasonable limits. The board would then make specific pass/fail recommendations to the Commission which would then make the final determination. Any cigarettes and any cigarette companies found in violation of the toxicity determination would be subject to the remedies of the CPSA.

I believe this third party testing program provides adequate assurances of compliance with the toxicity tests established by HHS and the CPSC. It is reasonable that the manufacturers pay for these tests just as drug companies pay user fees to the FDA and pesticide companies pay for testing their products by EPA.

Madam Chairwoman and members of the subcommittee, we know that very few companies voluntarily introduce safety advances in their products. For years the children's sleepwear industry told Congress and the public that the Commission's test methods were unrealistic, that making these garments more fire resistant would drastically increase their price and that a flammability standard would restrict consumer choice - some of the same arguments we will probably hear from the tobacco industry today. But the fact is that since the standard became effective 20 years ago burn deaths from children's sleepwear have declined from about 60 per year to around five, thereby saving over 1,000 lives. With this example in mind I urge you to approve H.R. 3885 with the changes I have recommended today. I am confident this will soon lead to fewer deaths and injuries and less property damage from cigarette ignited fires.

I estimate that implementing this legislation will cost the Commission $1.9 million. Attached as an appendix to my testimony is a breakdown of these costs.

UNITED STATES GOVERNMENT
U.S. CONSUMER PRODUCT
SAFETY COMMISSION
WASHINGTON, D.C. 20207

MEMORANDUM

**DATE:** April 14, 1994

**TO:** The Honorable Cardiss Collins
Chair, Subcommittee on Commerce, Consumer Protection and Competitiveness

**FROM:** Ann Brown, Chairman AB
Consumer Product Safety Commission

**SUBJECT:** Cigarette Safety Rulemaking Resource Needs

Resources needed to develop the rule is estimated at 7.2 FTEs, $430,000 for related salaries and benefits, and $1,462,500 for contract support, for a total dollar cost of $1,894,000. These costs would be spread over an 18 month period with most of the costs occurring in the first year.

In addition, enforcement of the rule is expected to require a minimum 1.5 FTEs for an annual cost of $90,000. The Commission can absorb these enforcement costs within its regular compliance and enforcement budget.

Table 1
Staff Months Required

| Directorate | Task | Staff Months |
|---|---|---|
| Compliance | address comments | 3 |
| Economics | address comments | 2 |
| Economics | do market update | 2 |
| Economics | address stockpiling | 2 |
| Economics | determine effective date | 1 |
| Engineering | engineering lab support | 5 |
| Engineering | project management | 9 |
| Engineering | administer NIST contract | 6 |
| General Counsel | review staff input | 1 |
| General Counsel | address comments | 1 |
| General Counsel | research | 1 |
| General Counsel | index cited material | 1 |
| General Counsel | draft NPR | 3 |
| General Counsel | draft final rulemaking | 5 |
| Hazard Analysis | address comments | 2 |
| Hazard Analysis | provide statistical support | 2 |
| Hazard Analysis | compile update of incident data | 6 |
| Health Sciences | address comments | 2 |
| Health Sciences | toxicity testing and data review (if needed) | 6 |
| Human Factors | address comments | 2 |
| Public Affairs | public relations activities | 3 |
| Various directorates | unspecified tasks | 7 |
| **Total** | | 72 |

Table 2
Contract Money Required

| Task | Contract Money |
|---|---|
| Determine link between low ignition propensity in laboratory testing and field and test to establish selection of pass-fail criterion (NIST) | $800,000 (12 months) |
| Toxicity testing (Health Sciences) | $500,000 |
| Video news release production (Public Affairs) | $10,000 |
| Video distribution (Public Affairs) | $5,000 |
| News conference (Public Affairs) | $2,000 |
| Satellite media tour with Chairman (Public Affairs) | $10,000 |
| Purchase mailing lists (Public Affairs) | $500 |
| Printing documents (Public Affairs) | $5,000 |
| Unspecified Tasks | $130,000 |
| **Total** | **$1,462,500** |

Mrs. COLLINS. Thank you.

I have here a statement from the ranking member of our full committee, Mr. Moorhead, and without objection his opening statement will be made a part of the record.

[The prepared statement of Mr. Moorhead follows:]

### STATEMENT OF HON. CARLOS J. MOORHEAD

Thank you, Madam Chairwoman. I would like to begin by thanking the distinguished chairwoman for holding today's hearing. Her dedication to consumer product safety is unquestioned. Chairman Moakley has also dedicated a large portion of his Congressional career to addressing the terrible problem of fires caused by mishandled cigarettes, and he should be commended for his efforts.

H.R. 3885, the Fire Safe Cigarette Act of 1994, would require the Consumer Product Safety Commission to issue a mandatory standard for so-called "fire-safe" cigarettes. In itself, the notion of developing a cigarette which is less likely to inadvertently start a fire is a good idea and one which I applaud.

However, as the CPSC noted in its 1990 study, there are numerous other factors which must be considered in addition to a cigarette's ability to start a fire. Issues like the toxicity of the smoke and the commercial acceptability of the cigarette are other issues which must be taken into consideration.

I hope our witnesses will take the time this morning to address these issues in their testimony.

Thank you, Madam Chairwoman.

Mrs. COLLINS. We will go now to Dr. Gann.

Dr. Gann, you may begin at this time.

## STATEMENT OF RICHARD GANN

Mr. GANN. Thank you, Madam Chairwoman, members of the subcommittee.

My name is Richard Gann. I am chief of the Fire Science Division at the National Institute of Standards and Technology.

I was chairman of the technical study group under the Cigarette Safety Act of 1984 and, again, chairman of the technical advisory group under the Fire Safe Cigarette Act of 1990. I also led the research effort at NIST under both Acts. My statement will show that the technology is in place now to begin developing a performance standard for less fire-prone cigarettes.

The United States continues to have one of the worst fire loss records in the industrialized world. The $128 billion annual cost of unwanted fires and fire safety measures are a significant constraint on efforts to revitalize this Nation. Cigarette-initiated soft furnishings fires continue to be the leading cause of fire deaths in our country.

To put the current situation in perspective, let me briefly summarize the results obtained under the 1984 and 1990 Acts. The former Act created a technical study group consisting of 15 representatives of Federal agencies, the cigarette industry, the furniture industry, public health organizations, and fire safety organizations. We were charged to determine the technical and commercial feasibility, economic impact, and other consequences of developing cigarettes that will have a minimum propensity to ignite upholstered furniture or mattresses.

In our final report, we unanimously concluded it is technically feasible and may be commercially feasible to develop such cigarettes. Further, the overall impact on other aspects of the United States society and economy may be minimal.

Under the latter Act, the CPSC was directed to assess the practicability of developing a performance standard to reduce cigarette ignition propensity, and six specific tasks were mandated, three for CPSC and three for NIST. The most critical of these was the development of a measurement method for cigarette ignition propensity. NIST developed two test methods both as the basis for a product performance standard and also to provide assistance to the cigarette industry in meeting the goals of any such regulation and in quality assurance testing. Both methods have valid links to the real world fire scenarios of concern. Both incorporate the relevant physics and chemistry of such ignitions.

The mock-up ignition method uses a simulated upholstery cushion such as this—a piece of fabric, a piece of foam. A cigarette is laid on it, and you merely measure whether or not ignition occurs.

The cigarette extinction test method replaces this substrate with some ordinary filter paper, and the test then determines whether the substrate absorbs enough heat from the cigarette to cause the cigarette to go out.

In extensive testing, the two methods gave totally consistent results. Further, a nine-laboratory round robin showed that the lab-to-lab variability of these results was comparable to that used for other fire test methods currently being used to regulate materials.

The representatives of the cigarette industry have raised a number of objections to, in particular, the mock-up method. To date, upon close scrutiny, all of their conclusions have been deemed technically unsound. Our conclusion is that the two methods provide valid information on cigarette ignition propensity.

We also tested 20 commercial cigarettes, and you have heard the results of those in previous testimony. I need not go into them, but we did find that while the best sellers did not show any low ignition propensity, there were five packings on the market that did.

There were four other tasks mandated under the Act, and our assessment of the results of those was that they were all in fact technically solid. The findings led the technical advisory group, by a vote of 11 to 4, to say that we believe that sufficient technology and information is available to deem practical the development of a performance standard to reduce cigarette ignition propensity.

I would also like to add that, as chairman of the technical study group and the technical advisory group, I have had ample opportunity to work with CPSC staff on this and also on other projects. I believe that they are indeed technically capable to lead development of such a standard.

In conclusion, there is now a wealth of information available, developed by experts and reviewed by experts, leading to a broad agreement that we are ready to proceed. The cigarette companies have demonstrated their capability to make cigarettes of reduced ignition propensity with no increase in tar, nicotine, or carbon monoxide in the smoke. The value to us as a country is high, both in terms of saving lives and avoiding unnecessary costs that could be better spent on national priorities.

Mrs. COLLINS. Dr. Gann, that red light means that your 5 minutes have expired, and anything else that you wanted to add in your statement will probably come out in the question and answer session.

Mr. GANN. I am through. Thank you, Madam Chairwoman.

[The prepared statement of Mr. Gann follows:]

## Statement of Richard G. Gann, Ph.D.

Mme. Chairwoman and Members of the Subcommittee, I am appearing before you in two roles. First, I have had the privilege of serving as Chairman of the Technical Study Group under the Cigarette Safety Act of 1984 (P.L. 98-567) and Chairman of the Technical Advisory Group under the Fire Safe Cigarette Act of 1990 (P.L. 101-352). Second, I have led the research effort at the National Institute of Standards and Technology (NIST) under both Acts. In this dual capacity, I welcome the opportunity to participate in this hearing. My statement will show that the technology is in place now to begin developing a performance standard for less fire prone cigarettes.

### The U.S. Fire Problem

The United States continues to have one of the worst fire loss records in the industrialized world. In addition to the human toll of about 4700 civilian and 100 fire fighter deaths, 29,000 civilian and 100,000 fire fighter injuries (1991/92 data from the National Fire Protection Association), fire safety measures and unwanted fires are costing our country over $128 billion annually. These expenditures are thus a significant constraint on efforts to revitalize the nation.

I am happy to say that the prognosis is good for improving this situation. Life loss from fires has been reduced by one-third since 1978. This has resulted from research leading to new technology and test methods, the proliferation of new products, and the efforts of the fire service and protection communities. For example, a first generation of smoke detectors has enabled early response to a large number of incipient fires. Standards for less ignitable upholstered furniture and mattresses (soft furnishings) have contributed to fewer deaths and injuries from such fires. Research is continuing to produce new understanding of fire growth and new concepts for containing the damage.

Nonetheless, cigarette-ignited soft furnishings continue to be the leading cause of fire deaths in our country. In 1990, these led to 1200 deaths, 3360 civilian injuries, $400 million in direct property loss, and a total cost to the country of $4 billion (CPSC data). Reducing the cigarette's likelihood of starting these fires will accelerate significant savings in lives and other national assets, and Congressman Moakley is to be commended for his leadership in bringing this about.

The National Bureau of Standards' Center for Fire Research, now part of the NIST Building and Fire Research Laboratory (BFRL), was chartered under the National Fire Prevention and Control Act of 1974 to provide the science and technology to reduce the burden of unwanted fires on the country. This continued a long NBS tradition of effectiveness in advancing fire safety technology. NIST is pleased to have worked with the Consumer Product Safety Commission (CPSC) on a number of fire safety issues.

**Previous Findings**

To put the current situation in perspective, let me summarize the results obtained under the 1984 and 1990 Acts.

The Cigarette Safety Act of 1984. This Act created a Technical Study Group (TSG), consisting of 15 representatives of government agencies, the cigarette industry, the furniture industry, public health organizations, and fire safety organizations. Our Group was charged to:

> "Determine the technical and commercial feasibility, economic impact, and other consequences of developing cigarettes that will have a minimum propensity to ignite upholstered furniture or mattresses, including:
>
> - identification of the different physical characteristics of cigarettes and little cigars which have an impact on the ignition of upholstered furniture and mattresses,
> - analysis of the feasibility of altering any pertinent characteristics to reduce ignition propensity, and
> - analysis of the possible costs and benefits, both to the industry and the public, associated with such product modification."

In our final report, a copy of which is appended to this statement, we *unanimously* concluded:

> "It is technically feasible and may be commercially feasible to develop cigarettes that will have a significantly reduced propensity to ignite upholstered furniture or mattresses.
>
> Furthermore, the overall impact on other aspects of the United States society and economy may be minimal.
>
> Thus, it may be possible to solve this problem at costs that are less than the potential benefits, assuming the commercial feasibility of the modified cigarettes."

These statements were based on laboratory tests of experimental cigarettes, some of which were of very low ignition propensity (confirmed with tests on real chairs), a thorough economic analysis of the potentially affected industries, and an analysis of fire losses. Several factors were found that led to the cigarettes showing reduced ignition propensity:

- reduced circumference,
- lower tobacco density,
- less porous paper, and
- reduction of citrate addition to the paper.

Considerably larger reductions were achieved with combinations of these. Several patented approaches also showed reduced ignition propensity. Limited evidence suggested that the presence of a filter may reduce ignition propensity. For some of the least ignition prone experimental cigarettes, the per-puff tar, nicotine, and carbon monoxide yields were within the ranges of yields from the best-selling commercial cigarettes.

In the economic analysis, the study considered only *direct* fire losses; and less ignition-prone cigarettes were deemed cost beneficial. More recent data including the *total* costs to the country make that assessment even more compelling. The TSG did note that the manufacture of less fire-prone cigarettes may require some advances in cigarette design and manufacturing technology. No cigarettes were tested for their acceptability to the smoking public.

The Fire Safe Cigarette Act of 1990. This second piece of legislation directed the Consumer Product Safety Commission to assess the practicability of developing a performance standard to reduce cigarette ignition propensity. It specifically mandated three tasks each for NIST and CPSC and asked a Technical Advisory Group (TAG), of nominally the same membership as the TSG, to advise and work with the two agencies. The specific tasks were:

NIST:

- Develop a standard test method to determine cigarette ignition propensity,
- Compile performance data for commercial cigarettes, and
- Conduct laboratory studies on and computer modeling of ignition physics to develop valid, user-friendly predictive capability.

CPSC:

- Design and implement a study to collect baseline and follow-up data about the characteristics of cigarettes, products ignited, and smokers involved in fires,
- Develop information on societal costs of cigarette-ignited fires, and

- Develop information on changes in the toxicity of smoke and resultant health effects from cigarette prototypes.

The TAG provided a critical forum for the technical work performed by the two Federal agencies and the cigarette industry, resulting in superior response to the mandates in the Act. The government benefitted immensely from this Group. The TAG members, who volunteered their time, merit the thanks of all concerned.

The work under this Act has been completed and the final reports have been submitted to the Congress.

Ignition Test Methods. The most critical task was the development of measurement methodology for a cigarette's ignition propensity. NIST has developed two test methods. Both are designed to fulfill two potential roles:

- the basis for a possible performance standard, and
- assistance to the cigarette industry in meeting the goals of any such regulation and in quality assurance testing.

Both methods have valid links (comparable to many current fire test methods) to many real-world fire scenarios of concern. Both incorporate most of the relevant physics and chemistry of such ignitions, while replicating the real-world hazard to differing extents. They are both performance tests, as contrasted with product design specifications. Both tests offer the use of a graded measure of performance, where acceptable levels can be set by the regulator. The research did not address specific regulatory criteria. A full report on the development of the methods is attached.

The *Mock-Up Ignition Test Method* uses three types of simulated upholstery cushions, each with a different cigarette ignition susceptibility. Each 20 cm x 20 cm assembly (substrate) consists of a top layer of one of three weights of cotton duck fabric (#4, #6, and #10, in increasing order of ignition susceptibility); a 5 cm thick piece of a polyurethane foam; and, in the least susceptible substrate, a thin layer of thermoplastic film in between. Tests are conducted in a plastic enclosure to eliminate variability due to laboratory air currents. A test begins by placing a lit cigarette on the mock-up. The performance measure is whether or not the mock-up is ignited (char propagation over 10 mm from the burning tobacco column). Either self-extinction of the cigarette or the cigarette burning its entire length without igniting the mock-up assembly are counted as non-ignitions. A complete test series consists of 48 replicates of each cigarette on each substrate.

The *Cigarette Extinction Test Method* replaces the more complex substrate of the Mock-Up Ignition Test Method with standard cellulosic filter paper. Otherwise, the test procedure is similar. The three substrates used consist of 3, 10, or 15 layers of the paper. The test determines whether a selected substrate absorbs enough heat from the cigarette coal to extinguish the cigarette. Performance with this method was roughly correlated to prior direct measures of cigarette ignition propensity. Here, increased reproducibility of test materials is gained at the cost of direct simulation of the real-world fire scenario. Sixteen replicates of each cigarette are performed on each substrate.

The two methods were shown to be of useful reproducibility in a nine-laboratory "round robin" study. The study involved cigarette industry, state and federal agencies, and private testing laboratories, and conformed to ASTM guidelines. Five of the available experimental cigarettes were tested, with selection based on their expected ignition performance. The study showed that the lab-to-lab variability of results was comparable to that for other fire test methods currently being used to regulate materials which may be involved in unwanted fires.

Specifications for the test materials were developed. All were deemed likely to be available, with long-term consistency, in the foreseeable future. For the fabrics, the areal density and potassium ion content were determined to be the major parameters affecting ignition susceptibility. Analysis of within-lot samples, lot-to-lot samples, and samples from two manufacturers showed that the normal production variations were within the acceptable limits demonstrated in the interlaboratory study. There is a long history of a large demand for cotton duck fabrics for both commercial use and military procurement. The polyurethane foam is representative of foam products used in the residential furniture market. Experiments showed that the effect of expected foam property variations (within nominally similar formulations) is minimal. The filter paper is a long-time, high-purity standard material for numerous chemical methods. Variations in the areal density, thickness and thermal conductivity are minimal. It was estimated that "fresh" substrate materials did not age substantially over about 6 months or longer.

Representatives of the cigarette industry have objected to the Mock-Up Ignition Method principally for two reasons. They maintain that (a) the fabrics are not indicative of those used in actual furniture and that (b) small changes in air flow past the cigarette could result in misleading results.

Both objections are invalid. The data for their first assertion lie in the industry's "500 fabric" study, in which they claim that most fabrics showed ignition susceptibilities different from the cotton ducks used in the Mock-Up Method. Independent analyses of the industry data by CPSC and NIST show that 80% of their fabrics rank cigarettes the same as the NIST data. Thus, the cotton duck/polyurethane foam substrates are indeed indicative of the ignition performance of the aggregate of real-world upholstery materials. Even though a small fraction of these fabrics do not correlate well with actual furniture, it is highly unlikely that the Mock-up Ignition Method would, as the cigarette industry has claimed, lead to even more ignition-prone cigarettes being sold. Consider the possible results of employing this method:

- Some cigarette designs may produce fewer ignitions (than the current market cigarettes) both in the test and when in contact with furniture containing fabrics that behave like the cotton ducks used here. The test method in this case is a true indicator of less fire-prone cigarettes.

- Some cigarette designs may produce fewer ignitions in the test, but not produce a reduced number of ignitions when in contact with furniture containing fabrics that are different in response from cotton ducks. It seems implausible that such designs would show greater real-world ignition propensity than do the current commercial cigarettes. Thus, these types of cigarettes would likely result in little change in fire losses.

- Still other cigarette designs may produce a large number of ignitions, both in the test method and when in contact with furniture containing fabrics which behave like the cotton ducks used here, comparable to current commercial cigarettes. For these, the test method is again a true indicator of expected fire performance.

- Some cigarette designs may produce a number of ignitions in this test that are comparable to the current best-selling cigarettes, but will produce a reduced number of ignitions when in contact with furniture containing fabrics which is dissimilar in response to cotton ducks. These designs would not likely be pursued; but, if they were, they would unobtrusively reduce fire losses.

Thus, only the second outcome might result in some harmful "reversals," and the industry's study shows only a small fraction of those fabrics.

At present there are insufficient data available to estimate what fraction of real-world furniture might contain fabrics differing substantially (*i.e.*, beyond the reproducibility of the test method) from cotton ducks in their ignition behavior. If further data were to become available indicating that such fabrics are a significant fraction of the real-world population, it would be an option to supplement the results of cigarette testing using this method with results based on other carefully-chosen fabrics.

The industry's second objection is also unsupported. Their air flow evidence is best presented by a study they commissioned at the Battelle Memorial Institute. The assertion was that small, directional air flows caused frequent reversal of the rankings of cigarettes. NIST review of the data found that there were none, that the claimed reversals were due to misunderstanding of the concept of experimental uncertainty. Our conclusion is that the Mock-Up Ignition Method provides valid information on cigarette ignition propensity.

There are data to "calibrate" the methods at the high and low ends of the ignition propensity scale. The commercial cigarette data in the TSG studies establish an indication of performance for the cigarettes associated with then-current fire losses. In the two new test methods, this performance is seen as a large number of ignitions on the #4 cotton duck or full-length burning on the 15-layer paper substrate. This establishes the test results for the high ignition propensity end of the scale. The TSG work, the current research, and cigarette industry studies demonstrate that there are experimental cigarettes that never or rarely ignited a variety of substrates. In the two new test methods, this behavior is observed as few ignitions on the #10 cotton duck or few full-length burns on 3 layers of filter paper. In between these extremes, one would like to expect a reduced number of fires as fewer ignitions are measured in the laboratory. The TSG correlation of mock-up results with chair tests indicates that such results can be expected to be indicative of performance for significant portions of the real-world furniture population, at least for coarse changes in test performance. If considering small increments, however, one must keep in mind the accuracy limits of the methods as discussed above.

For a product standard, NIST and the TAG have a preference at present for using the Mock-Up Ignition Test Method, because it is capable of better distinction among cigarettes of high ignition propensity. However, routine measurement of the relative ignition propensity of cigarettes is feasible using either of the two methods. The mock-up ignition method requires about 3 staff days to perform the 144 tests; the cigarette extinction method, with its simpler substrates and 48 tests, about 1 staff day. A rationale has been developed to reduce the number of tests for cigarettes of expected very high or very low ignition propensity.

Commercial Cigarette Performance. Twenty current commercial cigarettes were tested using the two methods. Fourteen of these were the best-selling packings, comprising nearly 40 percent of total sales in 1990. These cigarettes did not vary widely in their physical characteristics. They showed consistent ignitions on all substrates using the Mock-Up Ignition Method and consistently burned their full length on all substrates tested in the Cigarette Extinction Method.

Also tested were six other packings, each having one or two physical parameters (*e.g,* low circumference, paper porosity, tobacco density) which deviate from the best-sellers in a direction which prior research would suggest as likely to lower ignition propensity. All six of these packings showed reduced ignition propensity in the Mock-Up Ignition Test Method. Four of these packings rarely ignited the most difficult-to-ignite substrate; the other two ignited it in only 40-70% of the tests. Three of the four packings showed reduced ignition propensity on the middle substrate as well. While the Cigarette Extinction Test Method is less sensitive to changes in ignition propensity, three of the packings showed markedly fewer full-length burns. All these differentiations are outside the variability of the test methods. The average values of tar, nicotine, and carbon monoxide yields for these six packings were no larger than the averages for the 14 best-selling cigarettes.

Our findings led the TAG to conclude that it is possible to achieve reduced ignition propensity in a commercially feasible cigarette without increasing smoke toxicity (assuming that toxicity is represented by tar nicotine and carbon monoxide yields).

Further Accomplishments. The other four tasks under the Act also have been completed with technically solid products. NIST has developed two computer models: one for the time-dependent heating of a substrate when subjected to a moving heat source like a cigarette coal, one that models a burning cigarette. The two are used together to simulate a burning cigarette on a susceptible substrate. CPSC, working with the National Fire Protection Association and Mathematica, Inc., collected data on 564 fires in 8 cities and obtained telephone data about 1611 other smokers. They noted that there were cigarette properties that affected the risk of a fire: presence and length of a filter, paper porosity, and pack type. Other factors that were expected to show an impact (tobacco density and circumference) were almost constant in the fire-starting cigarettes; therefore no effect of variation could be considered. CPSC, working with the National Public Services Research Institute, appraised the annual cost of cigarette-initiated fires at $4 billion. Much of this is in health care expense. Spending on the smoke toxicity assessment project was limited by the Act to no more than $50 thousand. Nonetheless, the CPSC worked with leading experts to develop a 4-tier protocol for measuring the toxicity of cigarette smoke. Limited, inexpensive testing demonstrated that cigarette types can be distinguished by a few toxicological factors: tar, nicotine, and carbon monoxide yields; pH; benzo(a)pyrene and tobacco-specific nitrosamines; and salmonella mutagenicity.

**Summary**

The combination of findings under the two Acts led to the following general conclusions:

> "The Technical Advisory Group, by a vote of 11 to 4, believes that sufficient technology and information is available to deem practical the development of a performance standard to reduce cigarette ignition propensity."
>
> " ... the (Consumer Product Safety) Commission concludes that it is practicable to develop a performance standard to reduce cigarette ignition propensity."

As Chairman of the Technical Study Group and the Technical Advisory Group, I had ample opportunity to work with the CPSC staff. I believe they are technically capable to lead development of such a standard.

In conclusion, there is now a wealth of information available, developed by experts and reviewed by experts, leading to a broad agreement that we are ready to proceed. The cigarette companies have demonstrated their capability to make cigarettes of reduced ignition propensity with no increase in tar, nicotine or carbon monoxide in the smoke. The value to us as a country is high, both in terms of saving lives and avoiding unnecessary costs that could be better spent on national priorities. If H.R. 3885 were passed, NIST is ready to provide, on a reimbursable basis, any further technical work to support the CPSC in the required effort.

Thank you for the opportunity to present this statement. I will be happy to answer any questions that you might have.

Mrs. COLLINS. Mr. Shopland.

## STATEMENT OF DONALD R. SHOPLAND

Mr. SHOPLAND. Thank you, Madam Chairwoman.

My name is Don Shopland. I am with the National Cancer Institute, but I am appearing before this committee on behalf of the Department of Health and Human Services.

The needless tragedy of fires caused by cigarettes that ignite when dropped on upholstered furniture, mattresses, and other items is documented, and we know much more about that issue today than we did just 10 years ago.

I would like to recognize the leadership that CPSC has performed in their tasks over the last 10 years or so and also the leadership of Dr. Dick Gann who performed outstandingly, I think, under very trying circumstances.

As you know, Madam Chairwoman, cigarette smoking is this Nation's largest cause of death and disability and responsible for somewhere between 20 and 25 percent of the annual mortality that occurs in this country annually, yet this disease burden is not created by carelessness on the part of the consumer but is a direct result of consumers using the product specifically as intended by the manufacturer. This Department has worked closely with the CPSC and other agencies to reduce the number of fire-related deaths attributed to cigarette use.

An important issue discussed during our deliberations was that of cigarette toxicity and any changes in this toxicity that may result from new ignition-prone cigarettes that may increase disease potential to the smoker and to the nonsmoker. This committee, too, has voiced its concern about the public health importance of cigarette smoking when it mandated the Department to work with the CPSC to develop information on potential changes in the toxicity of cigarette smoke and resultant health effects of cigarettes with the reduced probability of starting fires.

The CPSC, through the technical advisory group, convened a panel of outside cigarette experts to help define the issues and recommend a testing protocol. These deliberations resulted in a 155-page report entitled "The Toxicity Testing Plan" that was submitted to the Congress last August as part of its reporting requirements.

We believe the toxicity plan as outlined is a reasonable one. It would require any new cigarette prototype to be tested and evaluated prior to its introduction to the marketplace, and the plan provides guidance for the development of data needed in order to evaluate changes in toxicity and as a performance-based plan rather than a design-based plan.

The proposed plan outlined four sequential tiers of testing, and in a very limited amount of testing that we did as part of the reporting requirements we were quite encouraged by the results of that testing. We actually looked at two cigarette prototypes and compared that to both reference cigarettes and to two commercially available cigarettes, and one of the findings was that in the two cigarette prototypes compared against the standard reference cigarette, the nitrosamines in the cigarette were actually somewhat lower than found in the reference cigarette. Benzopyrene, the carcinogen, was somewhat higher, but total tar, nicotine, and CO were actually about the same or even slightly lower.

The critical element not addressed by the expert panel, however, was the criteria against which any new cigarette prototypes would be judged for either acceptance or rejection, and development of such criteria will be a crucial step in the process prior to the implementation of any mandated performance-based testing.

This Department strongly believes that some degree of toxicity in testing should be mandated under this bill, and it would be our further recommendation that the actual cost of such testing once a final protocol is adopted should be the responsibility of the cigarette industry and not borne by the taxpayer.

Even with such testing, however, cigarettes will still be extremely hazardous and will continue to exact a very heavy toll on the health of this Nation. I feel compelled to reiterate that the largest risk from cigarettes show up years later in the form of cardiovascular diseases, at least eight major sites of cancer, including lung cancer, chronic obstructive lung diseases such as chronic bronchitis, emphysema, and also a number of severe and detrimental outcomes to pregnancy. We urge the American public, for the good of their health and those around them, that they should not smoke.

Thank you very much, Madam Chairwoman.

[The prepared statement of Mr. Shopland follows:]

### STATEMENT OF DONALD R. SHOPLAND

Good morning, Madam Chairwoman and members of the committee. I am Donald Shopland, Coordinator of the National Cancer Institute's Smoking and Tobacco Control Program. I am here today to testify on behalf of the Department of Health and Human Services (HHS) as its representative to the Consumer Products Safety Commission's (CPSC) Technical Advisory Group (TAG), established by the Fire Safe Cigarette Act of 1990. Thank you for inviting the Department to provide testimony on an important—in fact critical—aspect of the fire-safe cigarette issue. The needless tragedy of fires caused by cigarette designs that allow them to ignite when dropped on mattresses, upholstered furniture, and similar items is well documented. We know today much more about such issues than we did just a decade ago, thanks in large measure to the work of this committee.

Today's issue is one which HHS has long been concerned with, and one in which I have personally been involved since 1963. At that time I worked on the first Surgeon General's report which directly linked smoking not only with lung cancer but also with heart disease, chronic obstructive lung diseases and other chronic conditions. The HHS has and will continue to tell Americans about the range of health hazards from smoking, and about the illnesses caused from exposure to second-hand smoke. I am sure this committee is well aware of the statistic: cigarettes kill an estimated 400,000 to 500,000 Americans each year. Yet, this disease burden is not created by carelessness on the part of the consumer but is the direct result of consumers using the product specifically as intended by the manufacturer. Our participation in the effort to make a fire-safe cigarette should not dilute our commitment to eliminating cigarette and other tobacco product use among our Nation's people. Our message remains loud and clear: If you do smoke, stop smoking. If you don't smoke, don't start.

Cigarettes are a legal commodity in this country. Therefore, this Department has an obligation to help protect the lives of those who choose to smoke, and the lives of their families and friends. Since the passage of the Cigarette Safety Act of 1984, and the Fire Safe Cigarette Act of 1990, this Department has worked with the CPSC and other agencies to reduce the number of fire-related deaths attributed to cigarette use. An important issue discussed during the TAG deliberations related to possible changes in cigarette toxicity, and how these changes can be systematically assessed to design new cigarettes that may make the product more fire-safe but do not increase their disease potential either to the smoker or the non-smoker.

Last year alone some 50 million smokers consumed just under 500 billion cigarettes in the United States. When the tobacco and the additives in the cigarette are ignited, the pyrolysis process produces an estimated 4,000+ constituents. Some 60 of these constituents are either complete carcinogens or act as tumor promoters or tumor initiators. Other agents such as carbon monoxide, hydrogen cyanide, oxides of nitrogen, nicotine, formaldehyde, ammonia—just to mention a few—have been directly implicated in the disease burden in smokers and, more recently, in nonsmokers, when they are exposed passively to environmental tobacco smoke.

This committee clearly voiced its concern about the public health importance of cigarette smoking when it passed Public Law 101-352, the Fire Safe Cigarette Act of 1990. That law directed the CPSC to consult with the HHS to develop information on potential changes in the toxicity of cigarette smoke and resultant health effects of cigarettes with a reduced probability of starting fires.

The Act limited CPSC's funding to complete this task to $50,000, precluding any significant health testing. Nonetheless, the CPSC, through the TAG, convened a panel of outside cigarette experts to help define the issues and recommend a testing protocol. These deliberations resulted in a 155-page report entitled, "Toxicity Testing Plan", which was volume 5 of the CPSC report submitted to Congress last August as part of its reporting requirements under the Act. This report outlined both the details of the proposed toxicity testing protocol as well as provided results from the limited toxicity testing performed as mandated by the Act.

We believe the toxicity plan outlined is a reasonable one. It would require any new cigarette prototype, or reformulation of an existing cigarette, to be tested and evaluated prior to its introduction to the marketplace. The plan provides guidance for the development of data needed in order to evaluate changes in toxicity, and is performance-based rather than design-based. Furthermore, most of the tests recommended by the expert panel represent existing technologies and many are currently used by regulators to evaluate the health and safety of other consumer products.

In the proposed CPSC plan, four sequential tiers of testing were recommended:

Tier 1, chemical analysis of smoke, would examine the levels of specific tobacco smoke constituents in new cigarette prototypes and compare these levels to those found in existing commercially available brands or some other suitable control.

Tier 2, *in vitro* tests, would evaluate the mutagenicity of the smoke using a standard Ames assay procedure.

Tier 3, indicators of human smoking behavior, would involve examination of levels of specific tobacco smoke constituents or markers in actual human subjects (smokers) to determine if new cigarette prototypes alter human behavior and thereby increase exposure to known harmful elements in cigarette smoke.

Tier 4, *in vivo* tests, would examine the response of laboratory animals to the smoke of new cigarette prototypes.

Satisfactory performance at one tier would be required before proceeding to the next tier. It is important to note here that the proposed toxicity testing plan is not designed to directly examine or analyze health outcomes. It is well known that heart disease, cancer, chronic lung disease, and adverse outcomes of pregnancy are major health effects resulting from long term exposure to tobacco smoke, and cause hundreds of thousands of premature deaths annually. HHS, particularly the National Cancer Institute, continues to support a comprehensive research program related to various smoking, tobacco and tobacco use issues. This research program involves basic and applied research, studies relating to smoking and tobacco use behavior, and the development of new prevention and intervention measures that are culturally sensitive and appropriate, as well as effective.

As part of the TAG recommendations, a limited number of Tier 1 and Tier 2 testing was performed using two experimental (fire-resistant) and two commercially available cigarettes in addition to a standard reference cigarette and this information was provided in the CPSC report issued last fall. While budget constraints limited the analysis, the TAG was encouraged by their results which indicated that some Tier 1 and Tier 2 testing can distinguish differences between and among different types of cigarettes.

A critical element not addressed by the expert panel, however, was the criteria against which new cigarette prototypes would be judged for either acceptance or rejection. And development of such criteria will be a crucial step in the process prior to implementation of any mandated performance based testing.

This Department strongly believes that some degree of toxicity testing should be mandated under this bill. It would also be the recommendation of this Department that the actual costs for such toxicity testing, once a final protocol is adopted, should be the responsibility of the cigarette manufacturers, with appropriate oversight and review by the CPSC or other appropriate Federal agencies. Manufacturers of other consumer products such as certain foods, drugs, cosmetics, automobiles, etc. are required to underwrite testing and submit data to various regulatory agencies demonstrating the health, safety or efficacy of their products prior to marketing and the tobacco industry should be no exception.

This industry is in a unique position to underwrite the costs associated with toxicity testing. Last year the industry enjoyed gross sales revenues of $48 billion and almost $10 billion in profits; furthermore, according to the Federal Trade Commission it spent an estimated $4.65 billion to advertise and promote cigarette consumption, a 16 percent increase from just 1 year ago. Of all the industries in our society, the cigarette industry can more than afford to underwrite the cost of a testing process that provides at least a minimal degree of health protection. Even with such a testing process, cigarettes will still be extremely hazardous and will continue to extract a heavy toll on the health of the Nation. I must reiterate that the largest risk from cigarette use shows up as heart disease, cancer, chronic lung disease and adverse pregnancy outcomes, and that these occur not only in the smokers but in the people close to them who are exposed to their smoke. We urge the American public: for your good health and that of those around you, DON'T SMOKE!

This concludes my remarks. I would be happy to answer any questions.

Mrs. COLLINS. Thank you.

Let me say before I begin my questions that I neglected to do something that I think is important, and that is to welcome you, the Honorable Ann Brown, for your first appearance before our subcommittee as the new CPSC chairwoman. We are delighted to have you with us, and we are delighted that you hold the position that you do, knowing, of course, of your prior interest in the area of consumer interests, and we are delighted that you are before us today.

Ms. BROWN. Thank you. I am honored to be here before you.

Mrs. COLLINS. Thank you.

It is refreshing to hear from you that the CPSC wants to take the initiative on a product safety issue. Now, Chairman Brown and Dr. Gann, you were both interviewed on 60 Minutes, as we saw in the tape. You were interviewed there a few weeks ago, and I believe you have had a chance to look at some of these Philip Morris documents that we have been talking about today, and I would like to show all three of you on the panel two documents which are probably familiar to two of you from your appearance on 60 Minutes, and they are over there.

These two documents are from Philip Morris's Project Hamlet file. One is an April 29, 1987, Philip Morris memo, and the other is a revision of that memo that is dated June 9, 1987, and for our committee, we have copies of those up here.

[Testimony resumes on p. 86.]

[The following documents were submitted:]

CONFIDE

**PHILIP MORRIS U. S. A.**

**INTER-OFFICE CORRESPONDENCE**

**Richmond, Virginia**

To: . Ms. Barbro Goodman
Date: April 29,1987

From: . Angela D. Smith

Subject: . Hamlet Test

The results of the Hamlet test revealed that the ratings of the test cigarettes (D7T[illegible],a non-porous paper cigarette with a modified blend) were not significantly different from the ratings of the full flavored control cigarette ([illegible]) on the attributes of impact/throat grab, off-taste, aftertaste, and acceptability. There was a significant difference in the tobacco taste rating, where the control cigarette was found to be rated slightly higher on tobacco taste.

Methodology

Data from a Cross Operations mail-out survey was collected on 77 panelists. Fifty-one were full-flavor smokers and 26 were flavor-low smokers. Each panelist was asked to rate the cigarettes using seven point scales on the five attributes: "impact/throat grab," "off-taste," "aftertaste," "tobacco taste," and "acceptability." The identities of the cigarettes were not known to the panelists (control vs. experimentals) and each cigarette was replicated (2 controls and 2 experimentals). A two-way analysis of variance was performed on the data, followed up by the Duncan's student test for differences between the means. Also a nonparametric statistical test was performed in support of the ANOVA. This test was done to determine whether an analysis of the rank order would agree with the results from the numerical data.

Table 1. Analytical Results

| | Test Cigarette | Control Cigarette |
|---|---|---|
| FTC Tar mg/cigt | 16.3 | 15.9 |
| Nicotine mg/cigt. | 1.14 | 1.17 |
| Puffs/cigt. | 9.3 | 10.9 |
| Porosity, sec. | 20 | 85 |
| RTD, mm $H_2O$ | 5.2 | 4.5 |
| Tar/puff | 1.75 | 1.46 |

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## Results

The two-way ANOVA showed no significant differences in the rated means of the control and experimental cigarettes on the attributes of impact throat grab, off-taste, aftertaste, and acceptability. On the attribute of tobacco taste, a higher mean score for the control cigarette was found to be significant <p=.05.) The non-parametric statistics, the Wilcoxson Signed Rank test, also showed no significant differences in the mean ranks of the test vs. control cigarette on all attributes except tobacco taste. The results of this analysis did indicate a higher mean ranking for the control cigarette on tobacco taste (p=.06). The cigarette models appear to be equally acceptable to the smokers in this test.

Table 2. Mean Tobacco Taste Rating

| Test Cigarette | Control Cigarette |
|---|---|
| 3.78 | 4.09 |

Angela D. Smith

ADS:f

cc: Cindy Arterbery
Alan Confer
Paul Gauvin
Bill Geisrler
Dick Heretick
Willie Houck
Melissa Jeltema
Myron Johnston
Jan Jones
Peter Martin
Leo Meyer
Frances Scott
Howard Spielberg
John Tindall
Faye West
Louise Wu
Central File

Acceptability

|  | FF | FL |  |
|---|---|---|---|
| Con | 4.18 | 3.24 | =3.9 |
| Test | 3.73 | 3.32 | =3.6 |
|  | 51 | 25 |  |

Fl.low vs. FF?

CONFIDENTIAL

PHILIP MORRIS U. S. A.

INTER-OFFICE CORRESPONDENCE

Richmond, Virginia

To: . Ms. Barbro Goodman Date: June 9, 1987

From: . Angela D. Smith

Subject: . Hamlet Test
(Revision of Memo Issued April 29, 1987)

The results of the Hamlet test revealed that the ratings of the test cigarettes (D7TL, a non-porous paper cigarette with a modified blend) were not significantly different from the ratings of the full flavored control cigarette (TK) on the attributes of impact/throat grab, off-taste, aftertaste, and acceptability. There was a significant difference in the tobacco taste rating, where the control cigarette was found to be rated slightly higher on tobacco taste.

## Methodology

Data from a Cross Operations mail-out survey was collected on 77 panelists. Fifty-one were full-flavor smokers and 26 were flavor-low smokers. Each panelist was asked to rate the cigarettes using seven point scales on the five attributes: "impact/throat grab," "off-taste," "aftertaste," "tobacco taste," and "acceptability." The identities of the cigarettes were not known to the panelists (control vs. experimentals) and each cigarette was replicated (2 controls and 2 experimentals). A two-way analysis of variance was performed on the data, followed up by the Duncan's student test for differences between the means. Also a nonparametric statistical test was performed in support of the ANOVA. This test was done to determine whether an analysis of the rank order would agree with the results from the numerical data.

Table 1. Analytical Results

| | Control Cigarette | Test Cigarette |
|---|---|---|
| FTC Tar mg/cigt | 16.3 | 15.9 |
| Nicotine mg/cigt. | 1.14 | 1.17 |
| Puffs/cigt. | 9.3 | 10.9 |
| Porosity, sec. | 20 | 85 |
| RTD, mm $H_2O$ | 4.5 | 5.2 |
| Tar/puff | 1.75 | 1.46 |

## Results

The two-way ANOVA showed no significant differences in the rated means of the control and experimental cigarettes on the attributes of impact throat grab, off-taste, aftertaste, and acceptability. On the attribute of tobacco taste, a higher mean score for the control cigarette was found to be significant <p=.05.) The non-parametric statistics, the Wilcoxson Signed Rank test, also showed no significant differences in the mean ranks of the test vs. control cigarette on all attributes except tobacco taste. The results of this analysis did indicate a higher mean ranking for the control cigarette on tobacco taste (p=.06). The cigarette models appear to be equally acceptable to the smokers in this test.

Table 2. Mean Tobacco Taste Rating

| Control Cigarette | Test Cigarette |
|---|---|
| 4.09 | 3.78 |

Angela D Smith

ADS:f

cc: Cindy Arterbery
Kitty Bates
Alan Confer
Paul Gauvin
Bill Geiszler
Dick Heretick
Willie Houck
Melissa Jeltema
Myron Johnston
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RESEARCH CENTER

CHARGE NO. & TITLE: 2308 - ROOM AROMA COMPONENT EVALUATION

TYPE REPORT: ○ ANNUAL ○ SEMIANNUAL ○ COMPLETION ☒ SPECIAL

DATE: APRIL 19, 1982 PERIOD COVERED: MAY, 1980 - DECEMBER,

REPORT TITLE: IGNITION PROPENSITY OF CIGARETTES

WRITTEN BY A G Kallianos R. K. Greene
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[redacted]

[redacted]

KEYWORDS:
IGNITION PROPENSITY, UPHOLSTERED FURNITURE FIRES, CIGARETTES, PAPER ADDITIVES, TOBACCO ADDITIVES, FURNITURE MOCKUP TEST, NATIONAL BUREAU OF STANDARDS, CIGARETTE SAFETY ACT, IGNITION PROPENSITY INDEX, SELF-EXTINGUISHING CIGARETTES

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## ABSTRACT

A test method for the measurement of the propensity of cigarettes to cause smoldering ignition of upholstered furniture was developed. The test can differentiate cigarettes on basis of tendency to ignite upholstered furniture substrates, when conducted under highly controlled conditions. The test was used to rank several commercial and experimental cigarettes on the basis of ignition propensity and to define cigarette parameters that influenc their capacity to cause smoldering ignition in upholstered furniture

Cigarette models encompassing a wide range of ignition propensities as well as self-extinguishing models are described. The time required for a cigarette to ignite the furniture mockup is considered to be a measure of ignition propensity. The longer the time the lower the propensity. Cigarettes that self-extinghish when placed on the furniture mockup usually failed to ignite the substrate. Of the commercial cigarettes tested, the Nat Sherman novelty cigarettes were found least likely to ignite the mockup because of self-extinguishing features. The More cigarette was identified as the lowest ignition propensity cigarette among the regular commercial cigarettes tested.

## II. OBJECTIVES

1. Develop methodology for assessing the ignition propensity of cigarettes.
2. Develop the technology to produce a cigarette with decreased propensity to ignite upholstered furniture.

## III. METHODOLOGY

Our work on methods development explored several approaches, but focused primarily on the furniture mockup test, since that test was being used by the Furniture Manufacturers to measure burn resistance of fabrics and other furniture construction materials and parameters. Most importantly, the furniture mockup test was at that time being explored by the National Bureau of Standards (NBS) as a possible test to measure the ignition propensity of cigarettes. Prior to the introduction of the two bills that comprise the Cigarette Safety Act[2] there apparently had been no effort devoted to the development of a test for the propensity of various cigarettes to ignite upholstered furniture and mattresses. Accordingly, the provisions of the Cigarette Safety Act were predicated on the development of a satisfactory test, and since the responsibility for developing such a test rested with NBS, we felt it prudent to follow their work very closely.

The rationale for choosing the furniture mockup was based on the apparent advantage of the system to simulate real world situations. That is, cigarettes are tested on a fabric draped over polyurethane foam. A recognized shortcoming of the test is the fact that it involves the placing of cigarettes on a flat surface rather than in a crevice. A crevice is thought to be more relevan to the mode of most cigarette initiated fires in upholstered furniture. The test as proposed by NBS has many other disadvantages These became apparent to us early in our work and were mor recently[3] admitted by NBS with the statement that the developmen of a test to define the ignition propensity of cigarettes represen an exceedingly complex task. The National Bureau of Standards has now abandoned the furniture mockup test, although not totally[4], and has proposed a new candidate method which entails the placing of a burning cigarette on ashless alpha cellulose filter paper and measuring weight loss rate of the combination system. This is a variant of their earlier cellulose pad test which was abandoned.

Although our test methods have paralleled those of NBS, carefu attention to detail has allowed us to be successful in lending the furniture mockup test to be a useful procedure for measuring differences in the ignition propensity of cigarettes.

### A. The Furniture Mockup

Our tests have considered several of the variables that are involved in the use of the furniture mockup to measure the ignition propensity of cigarettes. The test included all-cotton upholstering fabrics in a range of weights (320-520 gm/sq M) and weave types with the usual water and soil repellents. Two densities of polyurethane foam were examined also. While our objective was cigarette evaluation and not furniture construction parameters, several variables of interest were noted. The fabric weight and weave type play a major role in the outcome of the ignition propensity test. Very gross weave patterns can act to hold the cigarette away from cellulose pad test. This test was proposed and abandoned as well by NBS. We also examined briefly the use of a battery of thermocouples inbedded in a substrate according to a procedure described by Olsen and Bollinger (1980)[5]. Heat conduction by the thermocouple wires and low temperatures recorded at the interface of the cigarette with the substrate discouraged exhaustive evaluation of this test. An alternate test, involving measurement of the rate of heat transfer from a cigarette to a heat conducting substrate in close contact with each other, was developed by our Physics Group and is described in a special report by C. O. Tiller[6]. More recently NBS published a report[4] which proposed yet another candidate procedure. This test measures weight loss rate, mg/min, of a system consisting of a piece of cellulose paper, 5 x 15 cm, with a lighted cigarette resting on it. The advantages of the test reside on the use of a well characterized cellulose substrate and the measurements of weight loss rate very accurately. The relevance of the test to ignition propensity of cigarettes escapes us, however. Basically, most of the weight loss measured is derived from the burning cigarette and very little from the charring of the pad. The tremendous amount of water condensing on the pad and the unstable equilibrium established as a consequence would tend to obscure the results. It should be noted, though, that the repeatability of the test is excellent. It is our feeling, however, that the test measures mostly the burn rate of the cigarette resting on the substrate.

Admittedly, the furniture mockup has its shortcomings as well. Most frequently mentioned is the shortcoming residing in the use of flat surface. Use of a crevice would probably be more appropriate n emulating the mode of most upholstered furniture fires by the igarette. We examined use of a crevice with some surprising bservations on the possible course and outcome of fires in pholstered furniture, but this did not appear as a practical test ethod for delineating subtle differences in ignition propensity of igarettes. A more detailed discussion of this is given in the ppended memorandum to Dr. R. B. Seligman dated June 4, 1981[7]. lthough, the furniture mockup test used in our studies fails to aithfully simulate all conditions relevant in upholstered furniture ires, it is a test that has been used by NBS to rank commercial igarettes and, in our hands, it has proven capable of delineating ifferences in ignition propensity of commercial and experimental garettes in a manner that is consistent with expectations and is some agreement with results presented by NBS and by the heat ansfer rate procedure mentioned above.

## . EXPERIMENTAL

The furniture mockup test was used to measure the ignition opensity index (IPI) of several commercial cigarettes and to aluate the effect of cigarette construction parameters and difications of tobacco and paper on ignition propensity. Unless herwise indicated the cigarette models were fabricated to normal ecifications except for the variable or variables under considera-on and, except where tobacco weight was the variable, the garettes were made to the firmness of regular production garettes. All cigarettes were equilibrated under the test condi-

[redacted]

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TO: Dr. W. F. Cannon DATE: January 6, 1977

FROM: H. B. Merritt

SUBJECT: Self-Extinguishing Cigarette [redacted]

At your request I have spent the last several days reviewing your files on this subject. As I understand it, your interest in this area stems from recent discussion with Dr. Joseph Clark, Assoc Administrator of the National Fire Prevention and Control Administr (United States Department of Commerce) - see memo: W. F. Cannon to Dr. R. B. Seligman, 10/26/76.

Dr. Clark indicated that carelessly or accidentally dropped or discarded cigarettes cause many of the fires in upholstered furnitu He indicated that some work by others has shown that a self-extingu cigarette would greatly reduce this problem.

I have defined a self-extinguishing cigarette as one that will go out in ~~between~~ 2-4 minutes if not puffed. Such a cigarette will have a ~~very~~ long static burning time, a small coal size (the small coal size is probably the major reason that this type of cigarette does not ignite mattresses, etc.), higher puff count per standard length, ~~and low~~ TPM ~~per puff.~~

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The question then is how might a self-extinguishing cigarette, that could be sold commercially, be developed.

This does not appear to be an impossible task. In discussion around the lab, I have noted that the problem of self-extinguishing cigarettes has been encountered many times particularly on the smokin machine.

#1 I suggest that we dig through the old data for self-extinguishin cigarettes, note their characteristics and attempt to find a common thread.

#2 We will need to establish a method of evaluating any candidates we develop. Reference to the Federal Test Methods for Cigarettes on Mattresses, No. DOC-FF-472, might be a good place to start.

#3 The application of burn retardants to the paper, the filler or both should be evaluated. Considerable york has already been done in this area using salt casing. The Cambridge cigarette, a shel~~ve~~f is a good example. However, none of these have been evaluated for their effect on ignition of mattresses, etc. These techniques do give smaller coal and slower static burn.

(? <-

F.i| The use of non-porous or low porosity paper, perhaps coupled with electrostatic perforation might be fruitful.

155 There is some information in the files about the use of vacuum metalized cigarette paper. A metalized pattern on the underside of the paper might be useful.

During the development of the brown cigarette paper (More), the problem of self-extinguishing was encountered. The use of organic additives to the paper might be useful, plus might give a flavor plus.

While there are many possible routes to go, there are, I believe other major considerations:

(1) The toxicity of the additive used.

(2) The effect of the construction changes on delivery (gas phase composition and flavor). [redacted]

TPn?

(3) Should a cigarette of this type be placed on the market, i self-extinguishing character would surely be noted and the inference of fire safety implied. Would this increase our liability for fires started by cigarettes? A difficult le question.

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After some thought, I believe that a reasonable commercially acceptable candidate could be developed in approximately one year given a moderate priority. The first thing to do is establish evaluation procedures.

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August 13, 1987

Dr. Richard Gann
National Bureau of Standards
Center for Fire Research
Quince Orchard Road
Building 224, Room B-250
Gaithersburg, MD 20899

Dear Dr. Gann:

I have reviewed the Second Draft of the Final Report of the Technical Study Group and I am quite concerned that parts of the Executive Summary are not an accurate reflection of the contents of the body of the Report. Also, there are statements in the body of the Report that are not accurate and therefore require modification.

A key issue that impacts the entire report deals with commercial feasibility. The experimental cigarettes manufactured by the tobacco industry for ignition propensity testing by the NBS CFR were chosen to represent the extremes of variables that might have an impact on ignition propensity. The fact that these experimental cigarettes were manufactured on commercial equipment in no way implies that their manufacture is commercially feasible.

More importantly, the issue of consumer acceptance has not been addressed. Consumer acceptance of modified cigarettes is absolutely key to commercial feasibility. Simply put, if the consumer will not purchase the modified cigarettes then the modification is not commercially feasible. Since the TSG has not tested consumer acceptability one cannot conclude that it is commercially feasible to develop cigarettes that will have a significantly reduced propensity to ignite upholstered furniture or mattresses. Furthermore, the chemical composition and biological activity of the smoke from modified cigarettes has not been tested. These issues are addressed in the body of the Report and do not appear at all in the conclusions section of the Executive Summary. The importance of these points cannot be overemphasized. Several passages in the current draft of the Report appear to suggest, to take only one example, that experimental cigarette 106 would be effective in reducing cigarette-related fires and has been found by the TSG to be commercially feasible. In fact, experimental cigarette 106 is comprised of 100%

[redacted]

MARLBORO BENSON & HEDGES MERIT VIRGINIA SLIMS PLAYERS PARLIAMENT LIGHTS SARATOGA CAMBRIDGE ALPINE MULTIFILTER

expanded burley tobacco and has a pressure drop of 500 mm-some 3 4 times higher than the highest pressure drop of any commercial cigarette. If a consumer were to tape four typical commercial cigarettes end to end (without removing the filters of any of the cigarettes), then light the end of the last cigarette the pressure drop he would experience would be roughly equivalent to the pressure drop of experimental cigarette 106. Attempting to draw through such a "cigarette" would be, as I am sure you can understand, virtually impossible.

The extreme pressure drop of experimental cigarette 106 could be alleviated somewhat, of course, by substantial additional ventilation of the paper. But the "smoker" of such a super-ventilated cigarette would not really be smoking at all. Because of the extreme ventilation, the draw of such a cigarette would be almost entirely air--the sensation would be similar to smoking through a straw.

Experimental cigarette 106, as well as the other experimental cigarettes, also suffer from other problems that stand in the way of their introduction into the commercial marketplace. But the situation described above illustrates the essential point: the TSG has not even begun to look at the question of commercial feasibility or differential health effects. To suggest otherwise, as is done in the current draft of the final report is undeniably misleading.

Given the above, I have rewritten the second paragraph and the conclusions of the Executive Summary to reflect the logical flow of conclusions from the available information. I urge you to seriously consider these recommended changes.

The second paragraph of the Executive Summary should reads as follows:

The TSG finds that it is technically feasible, in a laboratory sense, to develop cigarettes having a reduced propensity to ignite upholstered furniture and mattresses. Since consumer acceptability has not been addressed, however, the TSG has not been able to determine whether such cigarette modifications are commercially feasible. Available time also has prevented the TSG from investigating the health impacts of the cigarette modifications studied in the laboratory or developing, on a commercial basis, a standardized test methodology for measuring the ignition propensity of individual cigarette brands. Although the TSG has developed a model for assessing the possible costs and benefits of cigarette modifications designed to reduce ignition propensity, application of that model will require further research in a number of areas--including commercial feasibility and health impacts. Uncertainties with respect to commercial feasibility and health impacts also prevent at this time a meaningful assessment of costs and benefits.

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The conclusion section of the Executive Summary should read as follows:

The particular conclusions of this study are as follows:

- There are cigarette characteristics whose variation in experimental settings appear to reduce cigarette ignition propensity. These variations involve: reducing tobacco density, reducing paper porosity, reducing cigarette circumference and, perhaps, eliminating the citrate additive to the cigarette paper. Although the effectiveness of these variations is highly substrate dependent, and each presents as yet unresolved questions of commercial feasibility, they do provide promising avenues for further research and testing. Several patented approaches also suggest further research opportunities.

- Modifying cigarettes to incorporate the characteristics or features utilized in the experimental cigarettes studied by the TSG would require advances in cigarette design and manufacturing technology. Any cigarette modification, designed to reduce ignition propensity, also must be studied from the standpoints of consumer acceptability, smoke yields, smoke composition and biological activity.

- Mock-up measurements of cigarette ignition propensity can be used to predict, with a reasonable but not entirely consistent degree of accuracy, performance on full-scale furniture made of the same materials. However, the wide variation in those materials limits the use of mock-ups for cigarette testing to the research laboratory.

- A validated standard measurement method is needed to determine that a cigarette is less ignition-prone. It is also important to collect information on cigarette-ignited fires to determine how successfully future cigarettes perform.

- The TSG has not had sufficient time or resources to undertake the testing that would be required to determine whether cigarettes, modified within commercially feasible limits and not suffering from other objections, will significantly reduce fire losses.

- The per puff "tar," nicotine and carbon monoxide yields from some of the least ignition-prone experimental cigarettes were within 30% of those from the best-selling commercial cigarettes. But the TSG has not been able to assess other qualitative and quantitative changes in smoke

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composition that may be associated with the experimental cigarette modifications

- Although the TSG has developed a cost/benefit model to be used in connection with possible cigarette modifications, further research will be needed in a number of areas before that model can be applied in assessing the costs and benefits of any cigarette modifications that prove to be practicable. In particular, uncertainties with respect to commercial feasibility and health impacts prevent the undertaking at this time of a meaningful cost/benefit analysis.

My comments on the body of the report are:

1. I. A. United States Fire Loss Profile, page 6. The last sentence on page 6 should read:

   By constrast, cigarettes are consumed within a few months of their production [15], leading to the possibility that fire deaths and injuries could be reduced sooner if it were feasible to modify commercial cigarettes with reduced ignition propensity.

2. II. A. Background Knowledge, page 8. The first sentence of the last paragraph on page 8 should read:

   A few laboratory studies...

3. II. B. Technical Study Group Findings: Small-Scale Tests, page 10 Paragraph 1, line 1 - Delete "An inexpensive, rapid" and read - A procedure was adapted...

   Paragraph 1, line 4 - Delete "to represent furniture".

   Paragraph 2 - The last sentence should read:

   The results show that the differences in ignition propensity among current commercial cigarettes are insignificant. See Gordon Damant's revised report of July 21, 1987, page 5 under Damant's cover letter of July 27 to Dr. Gann.

   Paragraph 3, line 4 - Insert (sodium and potassium citrate.)

   Page 13, table 2 - Commercial cigarette 3 had 18 ignitions resulting in 90% ([19] page 96.) not 100% as in the report.

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Page 13, paragraph 2, line 1 should read:

The data show a wide range of ignition propensities in laboratory experiments.

Page 15, paragraph 2, line 7 - This should read sodium potassium citrate.

Page 16, paragraph 1, line 4 - This should read:

Nonetheless, the TSG feels that the concepts embodied in certain of the patents may offer promising directions for pursuit. Further research with respect to such patented concepts should focus on among other things resultant changes in smoke composition, biological activity and other properties such as manufacturing feasibility and consumer acceptability.

4 II. C. Validity of Small-Scale Data, page 17
The last paragraph should read:

The TSG concludes that mockup measurements of cigarette ignition can be used to predict, with a reasonable but not entirely consistent degree of accuracy, performance on full-scale furniture made of the same materials.

5. IV. Economic Impact..., page 21
Paragraph 1. Since commercial feasibility has not been demonstrated there is no rational basis for the conclusion in the first sentence of paragraph 1.

Paragraph 2. Presumption of the manufacture of cigarette 106 has no basis in the sense of commercial feasibility. In addition to the points already made with cigarette 105, 100% burley tobacco is not acceptable as a commercial cigarette. Futhermore, the experimental cigarettes supplied to the NBS CFR contain either 100% flue cured or 100% burley tobaccos. The U.S. cigarette market is a blended cigarette market. U.S. consumers will not accept all burley or all bright cigarettes. The choice of 100% bright or 100% burley in the experimental cigarettes is again a reflection of the need to scientifically evaluate parameters that might influence ignition propensity and argues against any intent to address commercial feasibility by the TSG. The assumption that 600 billion cigarettes of the 106 type would be consumed annually is totally unrealistic.

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Paragraph 3. In the absence of commercial feasibility there is no basis for this paragraph.

Page 22, Paragraph 5. At the same time, the TSG recognized that the question of smoke toxicity could not be resolved by focusing simply on per puff tar, nicotine and carbon monoxide yields. This clearly is an evaluation in which, before any modified cigarettes are introduced, further research is needed.

Page 23, paragraph 2 should read:

Although the TSG has developed a cost/benefit model to be used in connection with possible cigarette modifications, further research will be needed in a number of areas before that model can be applied in assessing the costs and benefits of any cigarette modifications that prove to be practicable. In particular, uncertainties with respect to commercial feasibility and health impacts prevent the undertaking at this time of a meaningful cost/benefit analysis.

Sincerely,

J. L. Charles, Ph.D.
Director, Research

/df

Greene

PHILIP MORRIS U. S. A.
INTER-OFFICE CORRESPONDENCE
RICHMOND, VIRGINIA

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To: Paul Gauvin
Date: January 9, 1986

From: Barbro Goodman

Subject: 1985 Accomplishments - 4009

Project Hamlet

Prototype cigarettes were made with different wrappers that met the criteria of reducing ignition propensity on our cloth mock-up. Some blends were found to perform better than others subjectively, but no model to date has had a taste similar to or as good as current commercial cigarettes.

Methodology for testing ignition propensity was refined by having an automated five cell smoldering cabinet constructed. Data collection from the new chamber is handled via an IBM P. C. Junior and a printer. An IR sensor and a thread (trip) cut-off measures the point of either ignition or self-extinguishment and the time is recorded on a printout.

A rate of weight loss method was also automated through a P.C., which is capable of handling statistical routines without going through the DEC computer. Examinations of different fabrics for the mock-up were made to parallel work done by the government committee in Washington.

Many different wrappers were evaluated for burn characteristics and deliveries. They include banded wrappers that give self-extinguishment in air from both Ecusta and Kimberly-Clark and slow burning wrappers from Kimberly-Clark and De Mauduit. All of the wrappers that performed well on the physical test have given taste problems compared to commercial cigarettes.

Cigarettes that are not self-extinguishing in air but match the More on cloth tests have been pursued subjectively. Models with equal tar per puff were tested on flavor panels and on the cross-complex panel with favorable results. A POL test was conducted on a full flavor model, which lost 40-60 to the control. Additional work was done to redesign the model.

Various compositions of extruded rods were tested in conjunction with the Filter Development project. Some promising combinations of rods and wrappers were identified.

Special cigarettes and wrappers were also supplied to Physical Research for heat output experiments.

Mrs. COLLINS. I believe the April 29 version was shown on the recent 60 Minutes telecast.

The documents reveal a test of two cigarettes among 77 smokers. One cigarette appears to be a regular control cigarette, while the other is a test cigarette presumably of lower ignition propensity, although Philip Morris apparently now claims otherwise.

Whoever on the panel is best able to answer a particular question should feel free to jump in, and the question is, what has the tobacco industry said about the acceptability to smokers of lower ignition propensity cigarettes? Either of you or all of you.

Ms. BROWN. Dr. Gann.

Mr. GANN. At one of the latter meetings of the technical advisory group, we invited each of the cigarette companies to present any information as to the consumer acceptance testing that they had done on low ignition propensity cigarettes. Two companies, RJR and American, presented data that showed that such cigarettes were unacceptable. I believe one company said that it was against company policy to present such information, and the others said they had none.

Mrs. COLLINS. Could you share with the subcommittee the results of the test?

Mr. GANN. I believe that some of that—I am sorry. Of which tests? The Philip Morris tests?

Mrs. COLLINS. The Philip Morris test, yes.

Mr. GANN. From my reading of the documents, it is clear that the taste test panel found that the replacement, if you like, Marlboro and the Marlboro itself were equally acceptable.

Ms. BROWN. Yes. The document says the cigarette models appear to be equally acceptable to the smokers in this test. Now this was from the 60 Minutes documents when they tested a Marlboro against another less fire-prone cigarette. I think the panel was 77 people in a test, and that document was dated April 29, 1987.

Data from a mail-out survey was collected on 77 panelists; 51 were full-flavor smokers, and 26 were flavor-low smokers.

Mrs. COLLINS. So one would think then that the industry assertion is apparently incorrect. Do you think that is an accurate statement on my part?

Ms. BROWN. Well, it would certainly appear to be accurate if these documents are accurate. I wasn't there for the inception and writing of those documents, but it would appear to be so.

There is also circumstantial evidence that since there are five cigarettes on the market, and even though they are not the best selling cigarettes, we do have information about those cigarettes that if the 5 cigarettes are just 1 percent of the market, they make $150 million per year for the company. So this is not insignificant when you consider that there are 5 cigarettes on the market that must be acceptable to some numbers of people.

Furthermore, as I mentioned in my statement, a member of one of the companies has come to us and said that there is a possibility of working voluntarily toward a fire-safe cigarette. If they are considering working on a fire-safe cigarette, even if they haven't, then there must be some possibility of commercial acceptability. I don't think that we would find cigarette companies thinking of offering to work voluntarily on something which would be commercially unacceptable. That hasn't been their style.

Mrs. COLLINS. Dr. Gann, are you aware that the industry has said that they are afraid that cigarettes with lower ignition potential in general may have much higher yields of tar, nicotine, and other dangerous products?

Mr. GANN. Those statements have been made numerous times over the last 10 years.

Mrs. COLLINS. Do you agree with those statements?

Mr. GANN. Certainly from the data that we have on these five reduced ignition propensity cigarettes, the tar and nicotine and carbon monoxide yields are indistinguishable from the best sellers. So it is not necessary that reduced ignition propensity be accompanied by higher tar, nicotine, and CO.

Mrs. COLLINS. When we look at the two memos, both of them have yield measurements for the tar and nicotine. It appears that the June 9 memo differs from the earlier version with the yields reversed between the control and test cigarettes, but looking at either of the memos, what do the yield numbers appear to show, Dr. Gann?

Mr. GANN. Essentially the tar and nicotine numbers are identical. They are within 3 percent of each other. The normal scatter amongst different brands of cigarettes in a given category can be 10, 20, 30 percent.

Mrs. COLLINS. So the assertions of the industry representatives are apparently less than correct.

Mr. GANN. I am sorry?

Mrs. COLLINS. Well, when the industry says that there is some big difference, that basically is not correct, according to their information, this test.

Mr. GANN. Certainly for this particular cigarette, there seems to be no difference.

Mrs. COLLINS. Did your tests show that this need not be the case? Did your tests show that cigarettes can be developed that are fire safe that have less tar and nicotine, that the public will accept, that there isn't any problem with the drawing of the cigarette and all this kind of stuff that we saw on 60 Minutes?

Mr. GANN. We did no consumer testing ourselves, we merely did ignition propensity testing of certain commercial cigarettes. As Chairman Brown said, if they are being sold, they must be acceptable to somebody, obviously a fair number of people, and the tar, nicotine, and CO yields from these cigarettes are no different than from the best sellers.

Mrs. COLLINS. Just one final question. I think a question was raised a bit ago by one of our members about matches. Chairman Brown, do you know whether or not there is any kind of CPSC or any other regulation or standard for matches and match books?

Ms. BROWN. Yes, there is a match book standard which is existing which has to do with performance and design of match books—where the striking surface is located, where the staples are, and that sort of thing—and that standard is in effect.

In addition, there is a cigarette lighter standard which is taking effect on July 12, 1994, which would make cigarette lighters child resistant, and, as I mentioned, to add to your question, actually, there is a mattress and bedding standard, there is a voluntary standard on furniture, there is a children's sleepwear standard. Most segments of the market that can protect against fire are doing so, so I would surmise that it is now the turn of the cigarette companies to add to the safety of the American people not to burn in fires.

Mrs. COLLINS. Thank you.

Mr. Greenwood.

Mr. GREENWOOD. Thank you, Madam Chairwoman.

A question for Dr. Gann: What seems to be the big difference structurally in the cigarettes that determines how prone they are to ignite?

Mr. GANN. There are a large number of variables in a cigarette. In our work we have only focused on a small number of those, and we have found some that, all other things being equal, lead one to a less likelihood of starting a fire—lower tobacco density, lower paper porosity.

[Bells sound.]

Mr. GREENWOOD. That indicates you get the questions correct. Keep going.

Mr. GANN. Thank you.

Smaller circumference, and there is limited evidence that suggests that the presence of a filter helps.

We also looked at a number of patented ideas for making a cigarette less ignition prone, and those ideas seem to work also.

By no means was it presumed that just because one has a brand with a smaller circumference and another brand that is a little fatter, that this one is the lower ignition propensity cigarette. Again, it is all other things being equal. These are tools for moving in the right direction. It also is not meant to be an exhaustive list of options.

Mr. GREENWOOD. I know that you just said you didn't study all of the variables and so there seems to be more information that would be helpful in this matter, but it also came out in the 60 Minutes piece, whether it is by coincidence or not, that the most popular brands tend to be the least fire safe and the most fire-safe brands tend to be the least popular. Is there a correlation there? Is there some reason to suspect that those factors that make cigarettes safer also make them less appealing?

Mr. GANN. I can't answer that directly. We tested the 14 best sellers because they were the best sellers; and they had uniformly high ignitions in the test methods. We then looked at some information that was provided to us in confidence by the cigarette industry on certain physical properties of the other several hundred cigarettes that are on the market, and we picked six that, to us, had values of the properties we were just talking about that would lead us to think they might be less ignition prone. The six that we picked are not therefore indicative of the, say, 500 non-best sellers, they are hand picked to find out if, in fact, our intuition were correct.

Mr. GREENWOOD. A question now for Ms. Brown.

If you were doing your analysis to set up your standards as to where the cutoff should be in terms of acceptability with regard to ignition, and you found that the safer the cigarettes became, the less appealing they became to consumers, then my question is this: If it gets down to the point where the safest cigarette is completely unappealing, where do you draw the line? Do you say, we are only going to go so far in fire safety in order to make sure that the cigarette still has some appeal in the marketplace?

Ms. BROWN. Well, I really don't accept that as a surmise because I think that it hasn't been indicated to be a problem. As we saw in 60 Minutes, the draw was the same; there are 5 commercially acceptable cigarettes on the market. I don't think this will be a matter of a trade-off between acceptability and fire safe, I think the two can be entirely compatible, and to reiterate what Congressman Moakley said, this is not some secret way to ban cigarettes or to make them unacceptable to people. It is simply this, if cigarette companies are going to continue to produce cigarettes and if people are going to continue to smoke, then the cigarette should not cause fires. We are not looking to make some awful filthy weed that people won't smoke and have some nefarious purpose here.

Mr. GREENWOOD. So you are confident that you could draft regulations that would significantly improve the safety factor without significantly affecting the appeal to those who smoke?

Ms. BROWN. All evidence points to that at this time.

Mr. GREENWOOD. Thank you very much.

Thank you, Madam Chairwoman.

Mrs. COLLINS. We are faced with another vote right now, so we are going to recess for about 10 minutes and come right back.

The subcommittee is recessed.

[Brief recess.]

Mrs. COLLINS. This hearing will reconvene at this time.

In a statement that was submitted for the record, Philip Morris has now denied that their test cigarette was fire safe, so let's look at an earlier memo from January 9, 1986, and the first two sentences of the fifth paragraph said, "Cigarettes that are not self-extinguishing in air but match the More"—that is the More cigarette—"on cloth tests have been pursued subjectively. Models with equal tar per puff were tested on flavor panels and on the cross-complex panel with favorable results." [See p. 65]. While the rest of the paragraph indicates that further work was probably necessary, what does this indicate to you, Dr. Gann?

Mr. GANN. When presented with this type of documentation before, my comment was that it is clear that Philip Morris was using some sort of methodology not grossly dissimilar from the one that we used in the test method and that they obviously got some degree of confidence in the results.

Unfortunately, in nothing that I have seen are those results reported, so I don't have any way of assessing that. But clearly the subjective statements in these memos indicate some degree of satisfaction.

Mrs. COLLINS. How are the five lower ignition-prone cigarettes currently on the market—I think we have a couple of them here. One is the Eve Lights, I understand, Slims 120's, and the other is the Virginia Slims Superslims. This is supposed to be a menthol low-smoke, ultra-low-tar cigarette. This one doesn't say that, where I can see it anyway.

But the question is, how do these five that we have identified already, that have been identified by CPSC and NIST, perform on these toxicological measurements? Either of you, either Dr. Gann or Chairman Brown.

Ms. BROWN. Dr. Gann, do you want to take this?

Mr. GANN. Do you want to know if the tar and nicotine from the Philip Morris experimental cigarette is better or worse than these? Was that the question?

Mrs. COLLINS. How do they compare with the market of the other cigarettes, do you know?

Mr. GANN. These 5 and the 14 best sellers—we did the average value of them, and they are indistinguishable.

Mrs. COLLINS. So they are generally in the range of other commercial cigarettes, in other words.

Mr. GANN. These are, yes.

Mrs. COLLINS. OK. In fact, the Technical Advisory Group found that these current commercial cigarettes show—and this is a quote—"Show yields of tar, nicotine and carbon monoxide that are no different in the aggregate from the best selling cigarettes." Would you agree with that?

Mr. GANN. That is correct.

Mrs. COLLINS. OK.

One of the key purposes of the Fire Safe Cigarette Act of 1990 was to develop a test method to measure ignition potential of cigarettes. The test method developed by NIST was approved by an 11-to-4 vote of the Technical Advisory Group, with the 4 dissenters being in the industry. Later today we are going to hear the industry criticize that test method.

Now let me show you excerpts from a Philip Morris document which appears to be from April 19, 1982, which is over 12 years ago. I am going to quote one sentence which says, "Careful attention to detail has allowed us to be successful in lending the furniture mock-up test to be a useful procedure for measuring differences in the ignition propensity of cigarettes."

The memo also noted that the rationale for the test was "the apparent advantage of the system to simulate real world situations."

Now does this sound like Philip Morris may have developed a test method way back in 1985, either of you—1982?

Mr. GANN. I think the answer is that they had developed, yes, a test procedure that allowed them to make some in-house appraisals of various potential cigarette designs. There is a difference between having a test method or a test procedure and a test method that is standardized, but it certainly looks like they were doing testing very similar to what we were doing.

Ms. BROWN. They certainly have been working on this, it appears from the documentation, for some length of time considering you have documentation from 1982.

Mrs. COLLINS. Mr. Shopland, I want to establish some facts for the record about the health effect of smoking, and these questions also go to the critical question of whether we can believe anything the cigarette industry tells us.

First of all, does cigarette smoking cause cancer?

Mr. SHOPLAND. That is correct.

Mrs. COLLINS. Does smoking cause heart disease?

Mr. SHOPLAND. Yes, it does.

Mrs. COLLINS. Is nicotine addictive?

Mr. SHOPLAND. Yes, it is.

Mrs. COLLINS. One of the real ironies here is to see the cigarette companies express concern about the possible toxicity of fire-safe cigarettes. After all, these are the same people who claim that cigarettes are not dangerous. It seems to me that they are just helping to make the case that perhaps all cigarettes ought to be regulated for toxicity,, as some of my colleagues on the Health and Environment Subcommittee have been arguing.

How would you respond, Mr. Shopland, to the industry's new found concern about toxicity? Do you think that fire-safe cigarettes can be developed that are within the same range as commercial cigarettes?

Mr. SHOPLAND. Well, I think at least in the limited amount of testing that we did under the previous Act. I think we demonstrated quite clearly, at least using two cigarette prototypes, that at least looking at things like the total tar, nicotine, and carbon monoxide, nitrosamines levels, benzopyrene, and what not, is that these, in fact, were quite similar to the reference cigarette and within the range of those that we find on the commercial marketplace today.

Mrs. COLLINS. Mr. Greenwood.

Mr. GREENWOOD. I have no questions, Madam Chairwoman.

Mrs. COLLINS. I have some more.

Dr. Gann, some have suggested that instead of trying to develop fire-safe cigarettes we ought to focus instead on improving the fire resistance of furniture. Others argue that it is cheaper to fix the cigarette, which after all is the cause of many of these fires. It is also pointed out that furniture has a much longer life-span, around 15 years, than cigarettes and that, as a result, changes in cigarettes would produce fire safety improvements much quicker than changes in furniture. Obviously, we have considered all approaches that would improve fire safety.

But as a fire safety expert, what would you say about these kinds of thoughts?

Mr. GANN. I think the 15-year lifetime, which is, I believe, generated by the CPSC——

Ms. BROWN. Correct.

Mr. GANN [continuing]. —Is a mean value. As you pointed out in your opening remarks, a large fraction, a disproportionate fraction, of the fires occur in poor households, and one might expect the lifetime to be even longer there.

So to the extent that the cigarette were improved, the speed at which the savings in lives, property, cost to the country would be realized would be sooner. Furthermore, one would expect that the penetration into those households would be faster.

Mrs. COLLINS. And my final question, Dr. Gann, is that we have an August 13, 1987 letter to you from Dr. J. L. Charles, director of research at Philip Morris. [See p. 65]. The letter criticizes the second draft of the final report of the technical study group and emphasizes the importance of testing reduced ignition potential cigarettes for commercial feasibility and consumer acceptance. He argues that since the TSG has not tested consumer acceptability, "One cannot conclude that it is commercially feasible", to develop fire-safe cigarettes.

Mrs. COLLINS. We now know this letter was written after both the April 29, 1987, and June 9, 1987, memos and after the January 9, 1986 memo. How would you read his letter today in light of the fact that Philip Morris had apparently already tested a consumer acceptable version of a fire-safe cigarette or at least a model with favorable results, Dr. Gann?

Mr. GANN. The wording of Jim Charles' letter to me says that, we in our report can't address it since we as a group haven't addressed it. The group as a whole agreed with that. So I think it, in fact, is a fair statement.

There is really no indication in this particular letter—there is no statement saying it can't be done, you can't make one, et cetera, et cetera. I mean that issue is not the one that is being discussed here.

Mrs. COLLINS. We will have some more questions that we are going to submit to you, and we would appreciate it very much if you would respond to those questions in writing within 5 working days.

Mr. GANN. I would be happy to.

Mrs. COLLINS. We certainly thank this panel for appearing before us. You have been very helpful in your testimony. Thank you for coming.

Ms. BROWN. Thank you very much.

Mrs. COLLINS. Our next witness will be the Honorable Charles Whitley, senior consultant for the Tobacco Institute. He is accompanied by Dr. David H. Townsend, who is the principal scientist for R.J. Reynolds Tobacco Company.

Won't you come forward, please.

## STATEMENT OF CHARLES WHITLEY, SENIOR CONSULTANT, TOBACCO INSTITUTE; AND DAVID E. TOWNSEND, PRINCIPAL SCIENTIST, R.J. REYNOLDS TOBACCO CO.

Mr. WHITLEY. Madam Chairwoman, Dr. Townsend appears to be out of the room at the moment, but I am sure he will be back immediately. Here he is.

Madam Chairwoman, I would like to ask at the outset, if I may, that I not be held too strictly to the 5-minute rule in view of the fact that I am the principal witness for the industry and we have had quite an array of anti-industry testimony including a number of pretty serious charges and allegations that I would like the opportunity to address in at least some detail. So I would like to ask the Chair's indulgence.

Mrs. COLLINS. Well, the Chair will be as lenient as the Chair possibly can within the rules and regulations of the House of Representatives.

You may begin your testimony at this time.

Mr. WHITLEY. Thank you, Madam Chairwoman.

First of all, as you indicated, I am accompanied by Dr. David Townsend who is a research scientist for R.J. Reynolds Tobacco Company. The six companies who manufacture cigarettes in the United States have filed statements for the record. We have also filed for the record a report of the joint venture organized by all of the companies to do additional research in the area of fire-safe cigarettes.

I want to express our appreciation to Mr. Moakley and to this subcommittee for giving us an opportunity to testify. To Mr. Moakley particularly for being as receptive to us and as cooperative with us over the years as he has been. I certainly want to assure you, Madam Chairwoman, and the members of this subcommittee, as we have Mr. Moakley, that it is the intention of the industry to cooperate fully with Mr. Moakley, with the subcommittee, with the CPSC, and others who are involved in this to the end that we will be able in this instance, as we have in past instances, to come to a reasonable agreement and accommodation in legislation in this area.

I must say, unfortunately, Madam Chairwoman, that the industry does oppose H.R. 3885 in its present form, and we note that even Ms. Brown could see immediately that the time frame there was not realistic, and we suspect that there are other considerations as well that need to be addressed.

I would like to say too, Madam Chairwoman, that the concerns that we have are not simply concerns that we have raised but these concerns are raised in the report of the CPSC itself, and that includes the one, Madam Chairwoman, on the question of toxicity, and I would just like to read a few of those concerns that were expressed by CPSC itself and not just by us.

The CPSC's August 1993 report emphasized, for example, that, "It is unclear that a standard based on the NIST tests will effectively address the number of cigarette-ignited fires." What that is saying in effect, Madam Chairwoman, is that if you adopt the NIST test there is no assurance that is really going to reduce cigarette fires in the real world.

In addition, the report said this—again, this is their language, not ours—even a small increase in human toxicity could outweigh the beneficial effects of fewer fires. They said this: The ignition process is a subtle one, and it is readily affected by air movement, which the NIST tests do not take into account.

Two, the range of potential benefits of a cigarette ignition propensity standard would depend upon the nature, technical, and commercial feasibility and projected effectiveness of any possible requirements.

They said this: Uncertainly about the commercial feasibility of lower ignition propensity cigarettes remains. This is from the report itself. Not all smoking fires are addressable by a widespread use of lower ignition propensity cigarettes. Therefore, the estimates that have been made may overstate the likely level of benefits of mandatory or other action to reduce cigarette ignition propensity.

Additional tests of the kind carried out by the tobacco industry would be necessary to make the cost-benefit findings that might be required to promulgate a standard.

Madam Chairwoman, a great deal has been made of the 60 Minutes program and the allegations that have been made relative to Philip Morris. Philip Morris has filed a written statement for the record, but I would like to read the provisions from that statement that relate specifically to Philip Morris inasmuch as a number of oral presentations have already been made in that connection.

In a program aired on March 27, 1994, proprietary research documents were shown on CBS's television show 60 Minutes. It is unfair and misleading to select specific sentences or in some cases sentence fragments or even single words from a collection of research documents and suggest that those excerpts represent the final conclusion of a research project.

It should also be kept in mind that the documents shown on the 60 Minutes program came from a collection of over 14,000 pages of documents produced in a single case in New Jersey. The case was ultimately dismissed because the plaintiff was unable to come forward with expert testimony that a "fire-safe cigarette" could be made.

The first document shown was a draft memo dated January 6, 1977, regarding a "self-extinguishing cigarette." This memo was written by a scientist at Philip Morris who was considering the issue for the first time. After reviewing existing files on the subject, he concluded that development of a self-extinguishing cigarette "does not appear to be an impossible task." This was the language highlighted on the screen by 60 Minutes. The author proposed a review of old data on these prototypes to identify a "common thread" that might be used to develop such a product. That common thread turned out to be nonporous paper, which invariably raises deliveries—that is, delivery of gaseous substances. This problem was discovered early in the research program and has been one of the major obstacles in product development in this area.

Another document used in the 60 Minutes was written 10 years later in 1987. This memorandum discusses the results of a preliminary subjective analysis comparing a control cigarette which 60 Minutes incorrectly referred to as a Marlboro with a "Hamlet cigarette." The test cigarette described in this memorandum incorporated a very low porosity paper and a modified blend. Project studies had shown that reducing porosity caused subjective problems and increased deliveries, especially of gas phase components of smoke.

One of the efforts to improve the acceptability of cigarettes with the nonporous paper was the use of modified blends. The test cigarette described in this memorandum was made with such a modified blend to see whether it improved the overall acceptability of the test cigarette. This cigarette was not self-extinguishing or fire safe. The cigarette was panel tested by 77 R&D personnel at Philip Morris. Each was given only two control and two experimental cigarettes and asked to compare them on several attributes.

With only 77 participants, the test was not designed for statistical analysis. It was designed to see what people thought of the modified blend in the test cigarette, and both cigarettes in this test delivered approximately 16 milligrams of tar, which makes them full flavor cigarettes. Among the full flavor smokers in this panel, the test cigarette was rated low in acceptability compared to the control.

Another problem with the test cigarette is the fact that it had very high deliveries particularly of gas phase smoke components on both a per cigarette basis and a per puff basis. This is a significant problem that could not be corrected without increasing the porosity of the paper and losing any ignition propensity benefit.

Research continued, however, to build on knowledge developed in this or other tests, and, in short, the test cigarette described in this memo is not reduced in ignition propensity and is not acceptable as a commercial product, and after over a decade of research in this area, Philip Morris has not been able to overcome the difficulties of realistically reducing ignition propensity and obtaining acceptable deliveries and subjective taste.

That concludes the statement regarding the Philip Morris product, Madam Chairwoman, and if you will indulge me, there are just a few other points I would like to make.

Mrs. COLLINS. Yes, without objection.

Mr. WHITLEY. Thank you.

Mrs. COLLINS. We had already put an additional 5 minutes on the clock for you.

Mr. WHITLEY. Thank you. I did not realize that.

Mrs. COLLINS. Well, the light had gone off and the bell had gone off, but we did put another—and you can verify it by witnesses up here.

You may proceed.

Mr. WHITLEY. Thank you. Thank you, Madam Chairwoman.

Much has also been made of the fact that there are five cigarettes now on the commercial market that would pass the cotton duck test which has been developed by Dr. Gann and the National Institute of Standards, NIST. Those five cigarettes are all nontypical, superslim, long cigarettes. The first thing about that is troubling to us is that when the industry tested those cigarettes with real world fabrics as opposed to cotton duck, they did not perform any better than the best selling commercial brands.

The companies took 500 real world fabrics at random they tested; 145 of them would ignite with any form of cigarettes, and of those 145, testing them with the five brands showed that only 21 percent of those fabrics tested better with these brands than they did the best selling commercial brands. So these pass the cotton duck test, but they don't pass when they are tested with fabrics in the real world; and, secondly, the point has been made that these five brands combined—and all of them, as I say, are superslim, long cigarettes. One even has, I think, brown paper. Their market acceptability is extremely limited. The five combined have a market share of less than 1 percent.

We categorically state that no cigarette company has developed or has on the shelf a product which can be put out to pass the NIST test and still have consumer acceptability, nor do we have the technology available to put such a product on the market that would pass that test and be commercially available.

Again, Madam Chairwoman, we stand ready, willing, and able to cooperate with Mr. Moakley, as we have in the past, with this subcommittee and its staff, with CPSC and its staff, to see what we can do. But actually we have not and do not have a cigarette now that would pass Dr. Gann's cotton duck test and be commercially acceptable, and, as I say, we did not raise the health concerns, they were raised by the CPSC report, but both the HHS witness who testified today and Ms. Brown have indicated an awareness of that as a problem, and we are not sure—this is the first time that we have seen her ad hoc solution. We don't any comment on that.

[Testimony resumes on p. 151.]

[The prepared statement and attachment of Mr. Whitley follow:]

Statement of

Charles O. Whitley

on behalf of

The Tobacco Institute

Subcommittee on Commerce,
Consumer Protection and Competitiveness
Committee on Energy and Commerce
U.S. House of Representatives

April 19, 1994

Madam Chair, distinguished members of the Subcommittee, and former colleagues. I appreciate the opportunity to participate in these hearings and to share with you the comments of The Tobacco Institute and its member companies on H.R. 3885.

Madam Chair, we applaud you for holding these hearings. As I hope to make clear, the tobacco industry cares deeply about cigarette fire safety -- as do, of course, all others who are participating in these hearings. Even though the number of cigarette-related fires has declined by more than 60 percent over the past decade, and the number of deaths and injuries from such fires has declined nearly proportionally, we have not yet achieved our common goal. The question with which the Subcommittee must wrestle is whether H.R. 3885 can best get us where we want to go so far as cigarette fire safety is concerned.

There have been two federally-funded studies of the cigarette fire-safety issue. The initial study, which was completed in 1987, set the stage for the second, which was completed last August. We are grateful to Representative Moakley, the sponsor of H.R. 3885, for his leadership on this issue. Representative Moakley, working with Representatives Boucher and Bliley, accomplished in 1984 and 1990 a feat that is seldom achieved in either Chamber -- crafting two important pieces of legislation that deserved, and received, nearly universal endorsement.

We very much hope that any differences that may exist among those who have been working on the fire-safe cigarette issue will not prevent our reaching a consensus on the most appropriate next steps. I can assure the Subcommittee of the tobacco industry's willingness to consider any reasonable proposal that will facilitate our search for solutions.

The tobacco industry has demonstrated its commitment to cigarette fire safety in many ways over the past several years -- by cooperating fully in the two federal studies; by initiating a cooperative research program that has had as its goal the development of a standardized ignition propensity test for cigarettes; by sharing the results of industry research on the measurement of cigarette ignition propensity with those having responsibility for the federal study effort; and by conducting independent research in the product development area.

The commitment the tobacco companies have made concerning cigarette fire safety is a commitment to real and demonstrable progress. We have stressed repeatedly the importance of having a reasonable basis for believing that any changes that are required to be made in cigarettes will reduce their ignition propensity -- not simply in artificial laboratory conditions but also in the places where such fires actually occur. We also have emphasized the importance of avoiding measures that would be counterproductive, leading to a net increase in the number of cigarette-related fires or having other undesirable consequences.

In view of our commitment to cigarette fire safety, and our respect for Representative Moakley, we would like nothing better than to be able to endorse H.R. 3885 in its current form. Unfortunately, we cannot. In the time that remains, I would like to summarize briefly where we are on the fire-safe cigarette issue and describe the reservations that we have concerning H.R. 3885 as currently drafted.

## I.

The Fire Safe Cigarette Act of 1990 directed the Consumer Product Safety Commission ("CPSC") and the National Institute of Standards and Technology ("NIST") to undertake several discrete tasks that had been identified as prerequisites to a final assessment of the practicality of developing a performance standard for cigarettes. The most important of the tasks involved the development of a test, or series of tests, to measure the cigarette's ignition propensity.

Pursuant to the Fire Safe Cigarette Act of 1990, NIST developed two cigarette ignition propensity tests. According to NIST, the first of the tests -- the so-called "primary" ignition test -- is preferable to the second. NIST therefore has recommended that the "primary" test be used in any performance standard that might be developed.

The "primary" ignition test recommended by NIST attempts to distinguish among cigarettes depending upon the likelihood of their igniting a very heavy fabric -- cotton duck -- that is not used on either upholstered furniture or bedding materials. Cotton duck is a canvas-like material used by the military for tents and other similar applications. The principal non-military use of cotton duck is as a covering material for sandbags, bookbags and director chair slings.

All laboratory-based ignition tests involve, of course, a degree of artificiality. Specifically, most rely upon surrogate materials and incorporate environmental constraints of one sort or another. If the surrogate materials behave like the materials they are supposed to represent, so that their behavior in the laboratory allows one to predict how real-world materials will behave, the mere use of surrogate materials is not itself objectionable. Similarly, if the environmental constraints (limitations on air movement and humidity, for example) do not affect the relative ranking of the ignition source being investigated, imposition of the restraints is not objectionable.

The threshold problem with NIST's "primary" test is that the propensity of a cigarette to ignite cotton duck fabrics is not predictive of the likelihood that the same cigarette will ignite the majority of fabrics that actually are used on upholstered furniture and in bedding materials. The environmental constraints that NIST has imposed -- particularly with respect to air movement -- also have been shown to undermine the test's predictive value. Finally, as NIST itself has acknowledged, the results produced by the NIST test are of limited usefulness because they vary for any given cigarette from one laboratory to another by up to 40 percent.

Even more troubling, substantial research -- conducted by the individual tobacco companies as well as by independent laboratories -- indicates that use of NIST's "primary" test actually may lead to an increase in the number of cigarette-related fires in some circumstances. None of the studies conducted by NIST allay that concern. Indeed, if anything, NIST's work confirms that the NIST cigarette rankings are far from absolute. See, e.g., 1993 NIST Report, pp. 8, 19, 28 and 31. We would like to submit for the record a July 1993 report by tobacco industry representatives to the CPSC, which summarizes the industry's concerns about the NIST ignition propensity tests and also discusses a variety of other important issues.

Many of our concerns about the NIST tests are reflected, at least in summary form, in the report submitted to Congress in August 1993 by the Consumer Product Safety Commission. The CPSC's August 1993 report emphasized, for example, that "it is unclear that a standard [based on the NIST tests] will effectively address the number of cigarette-ignited fires" (CPSC Report, p. vii). In addition, the CPSC report recommended consideration of the health consequences of requiring significant changes to be made in cigarettes since, in the CPSC's view, "even a small increase in human toxicity could outweigh the beneficial effect of fewer fires" (ibid.).

The CPSC report also contains a number of other findings that must be taken into account in evaluating H.R. 3885, including the following:

- "The ignition process is a subtle one, and it is readily affected by air movement" (id. at 4), which the NIST tests do not take into account;
- "The range of potential benefits [of a cigarette ignition propensity standard] would depend upon the nature, technical and commercial feasibility, and projected effectiveness of any possible requirements" (id. at 21);
- "[U]ncertainty about the commercial feasibility of lower ignition propensity cigarettes remains" (ibid.);
- "[N]ot all smoking fires are addressable by widespread use of lower ignition propensity cigarettes. Therefore, the * * * estimates [that have been made] may overstate the likely level of benefits of mandatory or other action to reduce cigarette ignition propensity" (id. at 22); and
- "[A]dditional tests of the kind carried out by [the tobacco] industry would be necessary to make the cost/benefit findings that might be required to promulgate a standard" (id. at 29).

Charges were made in a recent edition of *60 Minutes* that at least one tobacco company -- Philip Morris -- had developed by 1987 a "fire-safe" cigarette. Even without detailed knowledge of product development efforts at Philip Morris or any other tobacco company, there was and is ample reason to be skeptical of the *60 Minutes* charges. Among other things, a standardized test for measuring the ignition propensity of cigarettes had not even been proposed as of 1987. In fact, the major reason the Fire Safe Cigarette Act of 1990 was enacted was to facilitate the development of such a test.

I have brought with me, and would like to submit for the record, a statement from Philip Morris responding to the charges made by *60 Minutes.* I also would like at this time to submit for the record statements from each of the other major United States cigarette manufacturers summarizing the status of their product development work on cigarette fire safety.

Much also has been made in recent weeks of NIST data suggesting that some commercial cigarettes are less ignition prone than others. In addition, NIST has suggested that certain experimental cigarettes, specially created by the tobacco companies as part of the federal study effort, are less likely than current commercial cigarettes to start fires if dropped on upholstered furniture or bedding materials.

One basic problem with such claims is their reliance upon the "primary" ignition propensity test that has been developed by NIST. As I have noted, the results produced by the NIST tests -- "primary" as well as "secondary" -- have no demonstrable relation to the real world. It was for that reason, among others, that the CPSC stated in its recent report to Congress that "it is unclear that a standard [based on the NIST tests] will effectively address the number of cigarette-ignited fires" (CPSC Report, p. vii). Further, the experimental cigarette models created by the cigarette manufacturers as part of the federal study effort were designed solely to investigate the extremes of cigarette construction, without any consideration of commercial marketability.

It should be noted, in addition, that the NIST laboratory results are at odds with a number of findings reported from the field study that was conducted by the CPSC under the Fire Safe Cigarette Act of 1990. The NIST and CPSC studies offer conflicting answers to the question of what cigarette design features affect ignition propensity in the real world. Our inability to answer that question is of fundamental importance since it reveals again the problems inherent in NIST's "primary" and "secondary" ignition propensity tests.

A recent study -- summarized in the statement submitted for the hearing record on behalf of the American Tobacco Company -- has shown that commercial cigarettes that perform well on the NIST test are at least as likely to cause fires on actual upholstery fabrics as cigarettes rated by NIST as being "high" in ignition propensity. Still other studies, to which I referred earlier, have documented a pattern of actual reversals -- with "better performing" cigarette designs, rated using the NIST protocols, actually performing less well than their "high ignition propensity" counterparts when in contact with some actual upholstery fabrics and subjected to minimal air movement.

The basic point is that cigarettes do not have an intrinsic ignition propensity. Instead, ignition propensity is a complex phenomenon caused by the interaction of upholstery fabric or bedding materials, underlying padding, and other environmental conditions (such as air movement and humidity) as well as heat transferred from the burning cigarette. By using an unrepresentative fabric (canvas) and ignoring important factors such as air movement, the NIST tests produce results that are not predictive and often are misleading. Madam Chair, I would like at this time to submit for the record a statement from Mr. Frederic B. Clarke, former Director, Center for Fire Research, National Bureau of Standards, which expands on some of the technical points that I have made.

## II.

The difficulty we have with H.R. 3885 is that it does not provide an opportunity to address any of the complexities or unanswered questions summarized in the CPSC report to Congress. H.R. 3885 directs the CPSC to promulgate within one year of the bill's enactment "a fire safety standard for cigarettes to reduce the risk of ignition presented by cigarettes." All cigarettes manufactured beginning one year thereafter would have to comply with the standard. H.R. 3885 contemplates that the CPSC standard would be based upon, and would incorporate, the "primary" cigarette ignition propensity test developed by NIST.

Apart from comments provided to the CPSC during the fast-track regulatory process specified by H.R. 3885, the bill makes no provision for consultation with the tobacco industry or any of the other industries or groups that have participated in the federal study efforts. In addition, the bill effectively deprives the CPSC of any meaningful opportunity to consider such basic issues as --

- Whether NIST's "primary" or "secondary" tests provide a valid and reliable means of measuring cigarette ignition propensity across the range of fabrics and environmental conditions that are found in the real world;
- Whether modifying cigarettes to satisfy an ignition propensity standard would alter the chemistry of cigarette smoke in an undesirable way;
- Whether modified cigarettes would be rejected by consumers because of taste, smokability or other related problems; and
- Whether the societal costs of a cigarette ignition propensity standard would exceed its benefits.

As noted, the CPSC has expressed significant doubts in each of the areas just described. Indeed, the CPSC asked in its August 1993 report to Congress to be relieved of further responsibility should Congress mandate additional work in this area -- thus sending a strong signal that, despite six years of research under the CPSC's supervision, the CPSC is not convinced that additional federally-funded work in this area would be worthwhile.

We understand, of course, that the new Chair of the CPSC has indicated that she would welcome the enactment of legislation authorizing the CPSC to continue to play an important role with respect to cigarette fire safety. We welcome that decision and pledge the tobacco industry's full cooperation in any future CPSC initiatives. I also have been authorized to assure the Subcommittee that the individual tobacco companies in any event will continue their intensive research and development efforts to reduce the cigarette's ignition propensity.

## III.

Madam Chair, we continue to believe that the Federal Government can make a substantial contribution to efforts to solve the problems we have been discussing. As we move forward, we hope that the CPSC and the Subcommittee will be prepared to consider a range of measures designed to reduce the number of accidental fires, including those involving carelessly handled cigarettes. Such measures should include adoption by the CPSC of furniture flammability standards similar to those that have been implemented successfully in the State of California.

The results of the California program have been truly remarkable. In fact, the death and injury rate in California due to furniture fires from all ignition sources (including smoking materials and open flame sources) is more than 80 percent lower than the rest of the country on a per capita basis. We believe that the CPSC should consider taking advantage of the California program as part of the ongoing federal effort to reduce the incidence of accidental fires, including those involving upholstered furniture and bedding materials.

Madam Chair, I would like at this time to submit for the record a statement from Philip Schaenman, formerly Associate Administrator of the U.S. Fire Administration. Mr. Schaenman describes in his statement some of the more noteworthy approaches to fire safety that have been implemented in this as well as other countries and documents the success of such efforts. We hope that the Subcommittee will consider some of the approaches recommended by Mr. Schaenman as it continues its deliberations.

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In closing, permit me to emphasize once again the tobacco industry's commitment to address in an effective and appropriate manner fires involving carelessly handled cigarettes. I would be happy to respond to any questions from the Subcommittee.

# REPORT OF THE
# CIGARETTE IGNITION PROPENSITY JOINT VENTURE
# TO THE CONSUMER PRODUCT SAFETY COMMISSION

This report has been prepared by the Cigarette Ignition Propensity Joint Venture ("JV")[1] to respond to two proposed tests developed by the National Institute of Standards and Technology ("NIST") to measure the "ignition propensity" of cigarettes. The JV believes that the proposed tests are seriously deficient and fail to provide a valid and reliable measure of cigarette ignition propensity.

Because the proposed tests are invalid and unreliable, they should not be accepted as a basis for establishing a cigarette ignition propensity performance standard. A standard based on these tests is not an effective way to address the problem of fires involving carelessly handled cigarettes, and there are better ways to address that problem than by requiring unproven and potentially counterproductive changes in the design of cigarettes.

## A. Background

The Cigarette Safety Act of 1984 established a Technical Study Group ("TSG") to investigate the "technical and commercial feasibility, economic impact, and other consequences" of developing cigarettes with a reduced propensity to ignite upholstered furniture and mattresses. Upon the expiration of its mandate in 1987, the TSG -- relying upon research that had been conducted by the National Bureau of Standards ("NBS") -- reported that the development of cigarettes having reduced ignition propensity was "technically feasible." At the same time, the TSG noted that the commercial feasibility, economic impact, and health implications of such products remained to be determined.

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[1] The JV is a legal entity that was formed in 1990 by the six domestic cigarette manufacturers under the National Cooperative Research Act of 1984, 15 U.S.C. § 4301 et seq., to conduct joint research toward developing a valid and reliable standardized method for measuring cigarette ignition propensity and ensuring that any such test provide a reasonably accurate prediction of relative fire risks under real-world circumstances.

The reports submitted to Congress in 1987 by the TSG and on behalf of an Interagency Committee (comprised of representatives of the Consumer Product Safety Commission ("CPSC"), the United States Fire Administration, and the Department of Health and Human Services) described the work that was needed before any final conclusions could be reached concerning cigarette ignition propensity. Several recommendations of the TSG and the Interagency Committee were incorporated into the Fire Safe Cigarette Act of 1990.

One of the key recommendations made by the TSG and the Interagency Committee in 1987 related to the need to develop a standardized ignition propensity test for cigarettes. For the work conducted under the 1984 Act, the NBS had tested experimental cigarettes on small-scale "mock-ups" of upholstered furniture -- that is, pieces of fabric placed over polyurethane foam or cotton padding. The TSG's Final Report noted that, "because of the lot-to-lot variability of the fabrics and paddings used, this method should not be used as the standard test method." The Final Report also noted that "[n]one of the several alternative candidate test methods for measuring the cigarette ignition propensity of soft furnishings [is] usable in its current state of development." As a result, the TSG concluded that "[a] valid and reliable measurement method is needed to determine that a cigarette is less ignition prone."[2/]

In addition to calling for the development of a standard ignition propensity test for cigarettes, the 1990 Act appointed a Technical Advisory Group ("TAG") and instructed NIST[3/] and the CPSC to (1) compile performance data for cigarettes using the newly-developed standardized test method, (2) develop information regarding the health consequences of cigarettes modified so as to have reduced ignition propensity, (3) compile data on the cigarettes actually involved in fires, and (4) conduct "laboratory studies on and computer modeling of ignition physics to develop valid, user-friendly predictive capability." The 1990 Act required the CPSC to report to Congress by August 10, 1993, concerning each of these tasks.

### B. The Proposed Test

Although all 15 members of the original TSG (including the four members representing the tobacco industry) had endorsed the findings and recommendations in the TSG's 1987 report, the report of the TAG -- convened under the 1990 Act -- reflects fundamental disagreements among the TAG members. For the reasons

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[2/] TSG Report, Vol. 1, p. 1; see also National Bureau of Standards, "The Effects of Cigarette Characteristics On The Ignition of Soft Furnishings," TSG Report, Vol. 3 (hereinafter "1987 NIST Report"), p. 231.

[3/] By the time of the 1990 Act, the National Bureau of Standards had been renamed the National Institute of Standards and Technology. "NIST" will be used in this report to refer to work done under both the 1984 and the 1990 Acts.

described in the body of this report, the tobacco industry members of the TAG (who are also members of the JV) believe that the cigarette ignition propensity tests developed by NIST under the 1990 Act are not a valid or reliable measure of the ignition propensity of cigarettes in real-world conditions. In fact, as described below, there is substantial reason to believe that any performance standard based on those tests would actually be counterproductive, leading to an increase rather than a decrease in the number of fires involving cigarettes in real-world settings.

The deficiencies of the ignition propensity tests developed under the 1990 Act are the result of decisions made at NIST after the legislation was enacted. The preliminary research conducted at NIST during the 1985-1987 period had a specific and limited purpose, and in its 1987 report NIST cautioned that extensive further research was needed concerning a variety of issues. Regrettably, however, key portions of that research were not completed. For example, although the 1987 report called for developing information on the fabrics actually used by the upholstered furniture industry, NIST decided not to do so after being told by the furniture industry that such information was not readily available. Thus NIST never conducted a systematic survey of upholstery fabrics or their properties. As another example, NIST was unsuccessful in the effort -- suggested in the 1987 report -- to find a way to treat standardized fabrics with chemical solutions so as to vary their ignitability in a controlled manner.

Faced with an August 1993 deadline for reporting to Congress, NIST made a series of compromises that are difficult to explain or understand. Instead of continuing the search for representative upholstery fabrics, NIST utilized a canvas-type fabric (so-called "cotton duck") that is almost never used on upholstered furniture, and which is not representative of the vast majority of fabrics in common use. The primary ignition test proposed by NIST uses that fabric in its "as-received" condition, even though NIST acknowledged in 1987 that lot to lot variability in fabrics and paddings received over time can produce inconsistent results. The canvas-type fabric was chosen by NIST for the expressly-acknowledged reason that it was able to reproduce certain aspects of NIST's limited 1987 research. NIST adhered to that approach in the face of overwhelming evidence that the 1987 research could not be relied upon as an accurate measure of ignition propensity on fabrics commonly used on upholstered furniture and that cotton duck has little in common with those fabrics.

In addition, NIST made only rudimentary evaluation of environmental conditions important to ignition propensity. Instead, the test conditions stipulated by NIST for both of the proposed tests specifically exclude air flow, even though NIST itself has acknowledged that the presence of air flow may affect test results. Moreover, even with the extremely narrow test conditions selected by NIST, the tests produce inconsistent results (varying among laboratories by 40 percent or more).

As a result, the tests proposed by NIST have only limited practical value, if any. At best, any performance standard based on the tests developed by NIST would be meaningless -- requiring changes of unknown magnitude to be made in cigarettes without any firm basis for believing that such changes would reduce the number of fires occurring in the real world. The worst-case scenario is even more distressing: as explained below, there is substantial reason to believe that use of the NIST tests would result in cigarettes with greater ignition potential. The results of the Fire Incident Study conducted by the CPSC under the 1990 Act provide additional evidence that the proposed NIST tests do not accurately predict actual fire hazards.

## C. Related Issues

Other reports produced pursuant to the 1990 Act have raised questions about the potential health implications of modifying cigarettes to reduce ignition propensity. There are substantial gaps and other problems, however, in the toxicity testing plan developed by the panel convened by the CPSC on the health effects issue. Further, the panel's draft plan cannot be implemented until a reproducible and reliable cigarette ignition propensity test -- and test-certified cigarettes with potential for consumer acceptance -- have been developed.

The deficiencies in the NIST tests, the data provided to the TAG documenting lack of consumer acceptance of the cigarette modifications utilized in the experimental cigarettes that performed best in the NIST tests, and the potential health issues that have been identified raise the broader question of whether attempts to modify cigarettes are the most reasonable or efficient way of reducing the incidence of fires originating in upholstered furniture and mattresses. The 1990 Act focused exclusively on the cigarette, thus not considering other proven fire safety measures.

Since Congress first authorized the study of cigarette ignition propensity, fires attributed to careless smoking have declined substantially. Between 1980 and 1990, the number of such fires fell by more than 50 percent nationwide. Fire deaths attributed to careless smoking have declined by a nearly parallel 45 percent. Enhanced fire safety education and promotion of the use of smoke detectors appear to be most responsible for these dramatic changes. Furniture flammability standards implemented in California have produced even more dramatic results, with cigarette-related furniture fires in that state now being more than 80 percent below the national average. These developments confirm the importance of viewing the accidental fire problem from a balanced perspective and the greater potential for fire safety offered by approaches not involving unproven and potentially counterproductive changes in the design of cigarettes.

The discussion that follows elaborates on each of the points made above. Section I reviews critical aspects of the preliminary research conducted at NIST from 1985 to 1987. Section II reviews the research conducted under the 1990 Act, the test methods that NIST developed in the course of that work, and the deficiencies of those tests. Section III discusses the CPSC Fire Incident Study and its implications for the validity of the NIST tests. Section IV discusses the performance data that have been reported for current commercial cigarettes using the NIST tests, and the critical related issues of commercial feasibility and the cost/benefit implications of modifying cigarette design. Finally, Section V describes other fire safety options that are available to address the fire hazards resulting from carelessly handled cigarettes. The accompanying Technical Overview[4] and its appendices summarize and incorporate the extensive studies that document the bases for the conclusions set forth herein.

## I. NIST'S RELIANCE ON EXPERIMENTAL CIGARETTE RANKINGS REPORTED IN 1987 WAS INAPPROPRIATE

As NIST has acknowledged, the tests developed under the 1990 Act are designed to reproduce the "rankings" of the relative ignition propensity of selected experimental cigarettes reported pursuant to the 1984 Act.[5] The studies that led to the rankings were extremely limited in scope and were never intended to define actual ignition propensity across the range of conditions found in the real world. Nevertheless, the NIST researchers proceeded on the assumption that the rankings were absolute. And they adhered to that assumption in the face of overwhelming evidence that the rankings depend on the fabric used in any given test as well as environmental conditions.

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[4] Technical Overview of Cigarette Industry Research on Ignition Propensity Test Methods, July 1993.

[5] See, e.g., NIST, "Test Methods for Quantifying the Propensity of Cigarettes to Ignite Soft Furnishings," June 15, 1993 Draft (hereinafter "1993 NIST Report"), pp. 8-9.

In their 1985-1987 experiments, the NIST researchers used a series of 32 experimental cigarettes whose features -- such as circumference, density, and porosity -- had been modified to place them beyond the range of commercial cigarettes.[6] In addition, a limited set of fabrics was selected for research purposes. NIST itself noted that neither the fabrics nor the experimental cigarettes were chosen to be representative of commonly used commercial products, and that the sole purpose of the research was to investigate the effects of cigarette construction changes on ignition propensity.[7] It has long been known that the ignition behavior of cigarettes depends upon the characteristics of the substrate (that is, the fabric and the underlying padding) on which they are placed.[8] At no time during NIST's 1985-1987 work was it concluded that the rankings of the various experimental cigarettes represented relative ignition propensity on commonly used commercial fabrics.

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[6] The 32 cigarettes were specially manufactured (at the industry's expense) to the extremes permitted by the available technology. They represented all possible combinations of five factors: large vs. small circumference; low vs. high paper porosity; all expanded tobacco vs. no expanded tobacco; burley vs. flue-cured tobacco; and presence or absence of citrates (a cigarette-paper additive that ensures consistency in burn rates).

[7] 1987 NIST Report, pp. 1, 29.

The so-called "TSG rankings" reported in 1987 were based on very few tests or test replications. Although NIST began with roughly 20 substrate configurations (involving different combinations of padding and fabric), the rankings were based on only three substrates, selected because only those three appeared to show meaningful differences in the ignition propensity of the experimental cigarettes. In addition, each cigarette was tested on each substrate only five times, thus limiting the capacity of the test to reveal any differences among the cigarettes or to eliminate the possibility that any apparent differences were due to chance variations. Finally, the experimental cigarettes were "ranked" simply by adding the number of ignitions[9] produced by the five trials on the mock-ups. This procedure masked the fact that the individual substrates did not yield consistent rankings of the experimental cigarettes.[10]

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[8] See, e.g., id., p. 64 (acknowledging the "dependency of [cigarette] ignition propensity results on the substrate"); p. 231 ("the ignition process is a function of both the cigarette and the substrate").

[9] An "ignition" was defined as sustained smolder of the fabric and padding after contact with a lit cigarette.

[10] The reports of the two experts retained by the JV to analyze the 1985-1987 test results are contained in Appendix A to the Technical Overview.

Significantly, much of the 1985-1987 testing was disavowed by NIST itself at the time, or was shown to be unreliable by later studies:

- Two of the three fabrics that were used to develop the rankings have since been deemed by NIST not to be suitable test materials, and all were acknowledged to be "compromised" by inter- and intra-bolt variations in the level of smolder-promoting alkali metal ion contaminants in the fabrics that caused "poor reproducibility" of test results.[11]

- Highly inconsistent results were obtained across the three fabrics, with 21 of the 32 experimental cigarettes producing test scores that differed by as much as 100 percent, depending on the fabric, padding, and test configuration. The rankings of all but 2 of the 32 cigarettes also varied across the tests.[12]

- The mock-up tests that produced the greatest apparent discrimination among the experimental cigarettes were conducted in a "crevice" configuration (that is, the cigarette was placed at the junction of a horizontal and a vertical surface). By contrast, the primary ignition test proposed by NIST uses only a flat configuration on the ground that crevice tests are unreliable.[13]

In addition, NIST recognized that the experimental cigarettes incorporated only extreme values of design variables and that intermediate values between those extremes had not been tested. NIST therefore cautioned in 1987 that "[r]esearch is needed on more combinations of these factors . . . ."[14]

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[11] 1987 NIST Report, pp. 4, 231, 237; 1993 NIST Report, p. 5; April 23, 1992 Log of Meeting, CPSC Directorate of Engineering Sciences, p. 6.

[12] 1987 NIST Report, p. 63; Technical Overview, Appendix A.

[13] Compare 1987 NIST Report, p. 63 with 1993 NIST Report, pp. 27-28.

[14] 1987 NIST Report, p. 4.

NIST's claim that the mock-up tests are of relevance to the real world is based on tests conducted in 1985-1987 on full-scale pieces of furniture. Those tests, however, were even more limited in scope. Only 3 of the 32 experimental cigarettes used to determine the TSG rankings were included in those full-scale tests. The purpose of the full-scale tests was simply to compare the results of the bench-scale tests with the performance of full-scale furniture made of the same materials -- that is, to see whether there was at least some correlation despite the differences in scale. Further, the pieces of furniture used in the full-scale tests were not commercial products, nor were the fabrics and paddings intended to be representative of furniture in the market.[15]

Recognizing the limitations of its 1985-1987 work, NIST called for extensive further studies in several areas as "important to a sound understanding of the cigarette/furniture ignition phenomenon and to realization of the research into practical usage."[16] In each area, NIST cautioned that "[e]xtensive research is needed to better measure and define the effect of the substrate on the cigarette's ignition propensity." The need for "examination of a wider range of experimental cigarettes and substrates [and] measurement of cigarette ignition in crevices of soft furnishings" also was stressed.[17]

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[15] Even with these limitations, there were statistically significant discrepancies between the bench-scale and the full-scale tests. For example, cigarettes that tended to produce few ignitions in the bench-scale tests often produced a far higher percentage of ignitions in the full-scale tests. (See Technical Overview, Appendix A.)

[16] 1987 Report, p. 4.

The 1987 NIST Report included detailed and specific recommendations on the steps needed to develop a standard test. In view of discrepancies in results between tests conducted in the crevice configuration versus tests conducted in a flat configuration, NIST cautioned that "measurement of . . . [cigarette] ignition propensity should be conducted in both configurations."[18] In view of the effects of air flow observed in the full-scale tests, NIST also recommended that air flow be taken into account in future studies.[19] And because alkali metal ions were believed to be responsible for the varying results of tests conducted on the same fabrics, NIST recommended that test fabrics be identified that "could be scoured and then treated with controlled levels of smolder-enhancing ions."[20]

Unfortunately, NIST disregarded its own recommendations in virtually all of these areas in its work under the 1990 Act or, worse, expressly discarded the recommendations when scientific studies produced data that cast doubt on the TSG rankings.

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[17] Id., pp. 4, 237, 238.

[18] Id., p. 224 (emphasis added).

[19] Id.

[20] Id., p. 237 (emphasis added). These ions are trace amounts of potassium and sodium, generally in the range of 0 to 4000 parts per million ("ppm"), that are present in raw cotton fiber or are deposited as residues of chemical solutions used in dyeing or other processes. Their importance to enhanced fire safety is discussed in Section V below.

## II. NIST TEST METHOD DEVELOPMENT UNDER THE CURRENT ACT WAS CRITICALLY FLAWED

The fundamental error of developing a standard test method based on the TSG rankings was confirmed shortly after work began under the 1990 Act, when NIST found that it could not reliably reproduce those rankings. In response, however, NIST did not reconsider the validity of the earlier preliminary work or examine a wider range of cigarettes, fabrics, and test conditions. Instead, NIST narrowed its focus to a search for a fabric and set of test conditions that would produce results consistent with the TSG rankings. And when NIST found such a combination of fabric and test conditions, it adhered to that test method despite overwhelming evidence (produced by NIST as well as by the industry) that the fabric and test conditions were not representative of the real world.

### A. NIST's Inability To Reproduce Its Earlier Research

NIST began its work under the current Act by repeating the 1985-1987 mock-up tests, using eight of the original experimental cigarettes on the same three fabrics. Of the eight experimental cigarettes tested, the TSG rankings of all but two changed.[21/] NIST ultimately acknowledged that slight changes in air flow and in relative humidity in the laboratory, both well within the range found in the real world, were responsible for the changed results. The 1991 retest thus provided early confirmation that the TSG rankings were not reliable and that

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[21/] 1993 NIST Report, p. A-4.

slight changes in environmental conditions could cause major changes in test results.

The importance of one of those conditions -- air flow -- was reconfirmed at an early stage in the 1990-1993 period when the NIST researchers appropriately included low air flow in their experiments. For example, NIST found that, with even minimal air flow, the experimental cigarette that had produced the fewest ignitions of the 32 prototypes tested in 1985-1987 no longer behaved differently than the prototypes that had produced the most ignitions.[22/]

In addition, extensive industry-sponsored research was presented to NIST showing that the presence of air flow could actually cause "reversals" of the outcomes predicted by the TSG rankings. A series of studies, using a variety of test fabrics and experimental cigarettes, showed that prototypes supposedly having "low" ignition propensity (based on the TSG rankings) sometimes produced significantly more ignitions with air flow than their supposedly "high" ignition-propensity counterparts. For example, the TSG rankings suggested that, all else being equal, experimental cigarettes with low tobacco density and low paper porosity should have the lowest ignition propensity. The studies presented to NIST, however, showed that the presence of even slight air flow made that conclusion extremely dubious. Indeed, in each of those studies, one or more of the experimental cigarettes predicted by the TSG rankings to perform well in fact

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[22/] Id., p. 74.

showed higher apparent ignition propensity than cigarettes that were designed to be representative of popular commercial products.[23]

Faced with these studies and the results of its own research, NIST decided to drop air flow from its test method development. As reported at a March 30-31, 1992, Technical Meeting of NIST, CPSC, and industry representatives, NIST "has experimented with air flow in secondary tests and has discontinued those tests where the results have not been consistent with the TSG rankings."[24] Instead, NIST specified that the proposed test be conducted in a plexiglass enclosure designed to "isolate" the cigarettes from a factor -- air flow -- that "could lead to non-reproducible ignition behavior."[25] In other words, having identified an environmental condition that cast doubt on the validity of the TSG rankings, NIST simply excluded that condition from the proposed test.

### B. The Selection of Cotton Duck

As indicated by the 1985-1987 NIST research, the identification of test fabrics whose ignition behavior is representative of real-world materials is essential to the development of a valid and predictive test method. Indeed, NIST recognized in its 1987 report that investigation of a wide range of fabrics was necessary both to confirm the validity of the TSG rankings and to provide a sound foundation for selecting the fabric(s) to be used in any standard test method. NIST did not conduct any such studies during its 1990-1993 work, however. Instead, cotton duck was the only type of fabric examined by NIST and, not surprisingly, it became the only fabric used in the proposed so-called Mock-Up Ignition Test.[26] At a March 1992 meeting of NIST, CPSC, and tobacco industry representatives, NIST reported that cotton duck had been chosen for the Mock-Up Ignition Test based on a judgment that it (i) was most likely to produce results consistent with the TSG rankings, and (ii) would "allow discrimination" against popular commercial cigarettes.[27]

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[23] See Technical Overview, pp. 8-10.

[24] April 23, 1992, Log of Meeting, CPSC Directorate for Engineering Sciences, p. 5.

[25] 1993 NIST Report, p. 29.

The cotton duck fabrics chosen by NIST are canvas-like fabrics characterized by heavy weight and a dense, almost impermeable construction. They are commonly specified by the Department of Defense for military uses -- in backpacks, tents, medical stretchers, sandbags, etc. Consistent with these characteristics, cotton duck's principal use in furniture is reported by NIST to be as "director's chair canvas slings."[28]

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[26] A fabric described as "twill" was obtained by NIST but apparently was excluded from consideration when it was found to provide "only minimal differentiation" among cigarettes. (Id., p. 28). Similarly, the NIST 1990-1993 experiments used only two polyurethane foams that were quite similar to each other. (Id., p. 25.)

[27] April 23, 1993, Log of Meeting, CPSC Directorate for Engineering Sciences, pp. 5-6.

[28] 1993 NIST Report, p. 18.

in upholstered furniture and mattresses, cotton duck is rarely, if ever, used.

NIST spent approximately one year following passage of the 1990 Act trying to develop procedures to remove alkali metal ions from cotton duck samples and then add controlled levels of those ions to the fabrics. In a critical admission, however, NIST ultimately reported: "All of these potential additives eventually were rejected because none could produce cigarette differentiation when present in the cotton ducks at levels sufficient to assure evenly propagating, self-sustained smolder."[29] In other words, using a controlled fabric treated in accordance with the procedure it had suggested in 1987, NIST found that it was unable to obtain "cigarette differentiation." Thus NIST instead adopted the approach it had expressly rejected as unsuitable in 1987 -- the use of an uncontrolled set of fabrics "as received" from a single supplier.[30]

Moreover, NIST eliminated from that set of cotton ducks those varieties that failed to show ignition-propensity differences among experimental cigarettes. Cotton duck varieties are numbered in accordance with their weights, with the lower numbers denoting heavier weight. Two of the lighter cotton ducks -- ##8 and 12 -- were discarded when they were found not to provide sufficient discrimination among selected experimental cigarettes.[31] When cotton duck ##4, 6, and 10 were judged likely to produce results deemed sufficiently consistent with the 1987 rankings, an acceptable fabric was (i) declared to have been found, and (ii) arbitrarily deemed to be "representative" of the wide range of commercial fabrics in common use.

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[29] Id., p. 18 (emphasis added).

[30] Id., pp. 15-16.

## C. The Unrepresentative Qualities of Cotton Duck

In fact, the cotton ducks used by NIST have unique physical and chemical characteristics that place them far outside the range of commonly-used upholstery fabrics. Because of their dense weave, these cotton ducks are virtually impermeable to air. In addition, their average weight is considerably higher than most other fabrics, and they are 100 percent cotton (making them more ignitable than most fabrics). Finally, cotton ducks -- as received from the fabric manufacturer -- contain elevated levels of the alkali metal ions (principally potassium) that were reported by NIST in 1987 to be "pivotal" to fabric ignitability and to problems with the reproducibility of test results.[32]

Taken together, the unique physical and chemical properties of cotton duck make its ignition behavior unrepresentative of commonly-used upholstery fabrics. The physical properties of the material create a strong "heat sink" effect -- in other words, the heat loss that cigarettes experience when in contact with cotton duck is significant. Some cigarettes are so disturbed by this heat sink effect that they self-extinguish. On the other hand, if a cigarette withstands this temporary disturbance and continues to burn after being placed on the cotton duck, the fabric's cotton composition and elevated level of potassium ions make it highly prone to ignite. The 1993 NIST Report itself acknowledges that the unique "transient heat sink effects" of cotton duck are the "paramount" influence on the results obtained by the Mock-Up Ignition Test.[33/]

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[31] Id., p. 28.

[32] 1987 NIST Report, p. 10.

Moreover, even with three "as-received" cotton ducks as test fabrics, NIST found that they still fell short of producing results that conformed to the TSG rankings. NIST therefore added a sheet of polyethylene film to the test procedure, specifying that it be placed only under cotton duck #4 in order to provide an "additional heat sink" intended to make cotton duck #4 even more resistant to ignition.[34/] As NIST itself has acknowledged, the reported "discrimination" among cigarettes produced by the proposed Mock-Up Ignition Test rests in large part on the presence of the polyethylene film beneath the cotton duck #4.[35/]

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[33/] 1993 NIST Report, p. 17. The unique ignition behavior of cotton duck is confirmed by NIST's finding that cotton ducks become less ignition prone with increasing weight. Although studies of upholstery fabrics have found that heavier fabrics are typically more prone to ignite than lighter fabrics, NIST has noted that "the observed behavior of [cotton duck] fabrics is opposite to this trend; the heavy ducks ignite less readily than the lighter ducks." 1993 NIST Report, p. 17 (emphasis added).

[34/] 1993 NIST Report, p. 26.

[35/] *Id.*, pp. 54-59, G-2.

Neither in NIST's previous research nor in any other literature, however, has the extinguishability of a cigarette under the influence of a transient heat sink effect been considered a valid measure of its propensity to ignite soft furnishings in real world settings. The cotton duck fabrics and polyethylene film were selected by NIST for the purpose of forcing test results to conform to the TSG rankings, even though those materials have little if any known use in upholstered furniture or other soft furnishings. If a test is to be based on unrepresentative materials, the investigator's burden to show that the test is meaningful should be enhanced. NIST has not met that burden here.

In fact, extensive research by the JV shows that the test is not meaningful, and that cigarettes that self-extinguish on cotton duck (over polyethylene film) can behave quite differently on the lighter, more permeable fabrics that are predominantly used on upholstered furniture. This research shows that the vast majority of actual upholstery fabrics are physically, chemically, and behaviorally different from the cotton ducks used in the test developed by NIST, and that the ignition behavior of cotton duck is not representative of the overwhelming majority of actual upholstery fabrics.

To conduct this research, the JV sponsored what is believed to be the broadest fabric survey ever undertaken, obtaining 500 fabrics by asking four upholstery fabric stores to provide a cross-section of their most popular fabrics. Analysis of the fabrics shows that they differ physically and chemically from cotton ducks in critical respects.[16] Moreover, in the first round of testing, most of the 500 fabrics were found not to be ignitable.[17] On most of the remaining fabrics, either there was no difference in the number of ignitions regardless of cigarette design, or the tests produced rankings that were inconsistent with the TSG rankings. Fewer than 5 percent of the 500 fabrics (generally dense, heavy-weight fabrics) produced results that were consistent with the TSG rankings. A slightly higher percentage of the fabrics produced results that were "reversals" of the TSG rankings.[18]

The 500-fabric study thus provides compelling additional evidence that NIST's primary test method can at best hope to measure ignition propensity in relation to only a very small fraction of actual upholstery fabrics -- and then only before real-world air flows are taken into account. The study provides clear evidence that cotton ducks are not representative of most upholstery fabrics, and that the test developed by NIST does not accurately measure cigarette ignition propensity over the vast range of fabrics available in the marketplace. Instead, the primary NIST test method is based on a series of artificial and selective departures from real world materials and conditions.[39]

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[16] As explained in the Technical Overview, the average weight of the 500 fabrics was roughly 10 ounces per square yard, whereas the three cotton ducks selected by NIST have an average weight that exceeds 20 ounces per square yard. Similarly, only 1.4 percent of the 500 fabrics were found to be as impermeable as the cotton ducks. Finally, the average potassium ion levels of the 500 fabrics was 320 ppm, compared to the range of 4700-8200 ppm reported for the cotton ducks.

[17] As explained in the Technical Overview, only 145 of the 500 fabrics were found to be ignitable using a TSG "high" ignition propensity experimental cigarette.

[18] See Technical Overview, pp. 8-10.

## D. The Cigarette Extinction Test Method

As an alternative to the Mock-Up Ignition Test using cotton duck, NIST also developed a secondary "Cigarette Extinction" test method. NIST has acknowledged that the secondary test is inferior to the Mock-Up Ignition Test, however, and has not recommended that the test be used in setting product performance standards.[40] Nevertheless, it should be noted that the Cigarette Extinction Test is also the product of selective consideration of the available data in search of a preordained result.

NIST began investigating a wide variety of approaches to a "secondary" or "indirect" test method over a decade ago. Measurements of cigarette performance factors such as combustion temperature, smolder rates, and ability to continue burning in a wide variety of experimental settings all failed, however, to show significant differences even among the specially-produced TSG prototypes.[41] Among the many combinations of cigarette properties and secondary test methods investigated by NIST to date, only one was found to produce results that conformed to the TSG rankings. That method was then defined to be a "useful test method" simply because it produced the desired results.[42]

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[39] The selective approach taken in the development of the Mock-Up Ignition Test is further illustrated by NIST's exclusion of "crevice" tests. As noted earlier, the TSG rankings were based in part on such tests, which simulate situations in which a lit cigarette comes to rest in the crevice between a furniture seat cushion and an arm or backrest. In its 1993 Report, NIST agreed that the "greatest realism" for a test method "would doubtless come in some degree of crevice configuration . . . ." (Id., p. 27.) But although NIST conducted "limited experiments" using the crevice configuration between 1990 and 1993, its report does not disclose the results, which are said only to have been "not helpful in seeking the desired discrimination." (Id., emphasis added.) In short, despite NIST's 1987 identification of crevice tests as essential to the development of a test with real-world predictive value, its 1993 Report stipulates that all tests are to be conducted using only a flat mock-up.

[40] 1993 NIST Report, p. x.

In the Cigarette Extinction Test, cigarettes are placed on Whatman Filter Paper (which is ordinarily used to filter chemical solutions). By experimenting with varying numbers of layers of the Whatman paper, NIST ultimately found a sequence (using 3, 10, and 15 layers of paper) in which the experimental cigarettes that extinguished before burning to completion tended to coincide with the TSG rankings. Physically, however, the Cigarette Extinction Test incorporates essentially the same "transient heat sink effect" on which the Mock-Up Ignition Test Method is premised.[43] In other words, the one secondary test that NIST has deemed to produce acceptable results is merely a more artificial version of the Mock-Up Ignition Test. As with the Mock-Up Ignition Test, the Cigarette Extinction Test rests entirely on the faulty premise that the TSG rankings define ignition propensity in real-world circumstances.

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[41] See id., pp. 69-79. The potential secondary tests that NIST investigated included (i) measuring the burn rates of experimental cigarettes under a variety of conditions, (ii) measuring their heat output, and (iii) measuring their extinguishability when placed on a variety of non-ignitable substrates such as glass plates, glass rods, glass beads, and fiberglass filter materials.

[42] Id., p. 70.

[43] As explained by NIST in its 1993 Report, increasing the number of filter paper layers is intended to create an increasingly strong heat sink. Id., p. 91.

### E. Non-Reproducibility of Test Results

Even with the extremely narrow test conditions selected by NIST, the tests have limited practical value under any circumstances because of a high degree of inconsistency in results, i.e., poor "reproducibility." Reasonable reproducibility of results when the same test is conducted in different laboratories is essential to any test method -- including one designed to measure cigarette ignition propensity. A test method that does not produce consistent results when the same cigarette is tested in different laboratories using the same procedures cannot be used to guide product development or evaluation.

As reported by NIST, the "reproducibility limit" of its proposed test methods -- that is, the margin of error whenever two laboratories apply the proposed test methods to the same cigarette -- is estimated to be 40 percent.[44] In practice, this means that the results obtained for any given cigarette can be expected to vary by up to 40 percent when the same test is repeated in another laboratory. To illustrate, a cigarette that, for example, produces 24 ignitions out of 48 trials in one laboratory can be expected to produce results that range from 5 to 43 ignitions when it is tested in a second laboratory.

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[44] 1993 NIST Report, p. ix. This reproducibility figure assumes that each laboratory conducts at least 48 trials of each cigarette.

NIST has acknowledged that the reproducibility of the proposed test methods "places a limit on the degree of resolution possible for regulatory use of the method" and that the tests can measure only "coarse changes" in cigarette performance.[45] In fact, the acknowledged reproducibility problem renders the proposed tests impractical for use in product development or in establishing a performance standard.[46]

The concerns raised by the poor reproducibility of the proposed test methods are heightened by NIST's elimination of real-world fabrics and conditions that have been found to produce inconsistent or contradictory results. When the widely varying array of fabrics and environmental conditions found in the real world are taken into account, it is apparent that the proposed test methods are critically flawed.

## F. The Need for Further Research

When industry research showing that air flow can have major effects on test results was first presented, NIST researchers questioned whether air flows in the ranges incorporated in those studies are actually present in real-world fire settings. To address that question, the JV funded a major study by the University of Virginia to determine the presence and dynamics of air flow on upholstered furniture surfaces. The study demonstrated that, even with all external sources of air flow (such as heating or cooling systems) eliminated from a room, air flows are generated on the surface of a chair or sofa -- for as long as 30 minutes or more -- simply by the residual body heat of a person who had once been sitting there. These air flows (generally 5-10 feet per minute) are in the same range found in the ignition studies to cause "reversals" in the TSG rankings.[47]

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[45] Id., pp. x, 98, 101.

[46] Yet another problem is that the reproducibility of the Mock-Up Ignition Test in particular may deteriorate over time. The Mock-Up test relies on cotton duck fabrics that were produced by a single supplier over a four-month period. NIST found significant variations in the physical and chemical composition of the fabrics even over that limited period. (Id., pp. 18-21.) As the NIST Report cautions, "conclusions about multi-year variability obviously cannot be made on the basis of the present study." (Id., p. 102.)

In addition, Battelle Laboratories, a leading independent research organization, was asked to conduct its own investigation of the effects of air flow on cigarette ignition behavior. Using test equipment and procedures designed independently, the Battelle study found that the relative ignition propensity of the experimental cigarettes involved in the TSG rankings depended both on the fabric selected for any given test as well as the level of air flow. Moreover, the Battelle study confirmed that air flow can cause cigarettes with low TSG rankings to become consistently more ignition-prone than either commercial-type cigarettes or even TSG cigarettes designed to have elevated ignition propensity. The Battelle study concluded that any test method that seeks to measure cigarette ignition propensity should include a range of substrates with varying ignitabilities under various environmental conditions.[48]

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[47] See Technical Overview, p. 13.

NIST's report does not appear to take issue with the validity of the industry's air-flow studies or their implications regarding the presence of air flow in actual fire situations. Instead, NIST has asserted that it is appropriate to exclude air flow from the proposed test methods based on conjecture that "[m]any ignitions may occur down in a crevice-like crack, such as is formed by the seat cushion and the side of the chair and the air flow there is likely to be very small . . . ."[49] NIST thus assumes that it is sufficient for a test method to concern itself only with scenarios in which a cigarette somehow falls so deeply into a crevice that it is beyond the reach of circulating air. This assumption is puzzling, particularly in light of the fact (noted earlier) that NIST found it could not produce the desired discrimination using crevice tests and therefore excluded the crevice configuration from its test methods.

In the end, however, NIST does seem to acknowledge that further studies of air flow and upholstery fabrics in common use may be appropriate. For example, the agency has acknowledged that, as "more information on the responses of cigarettes to real world conditions" is developed, "it may be appropriate to supplement the no-imposed-flow test behavior with other data."[50] Similarly, NIST has stated that it currently lacks sufficient data to estimate what fraction of real-world furniture might contain fabrics that differ from cotton duck in their ignition behavior, but that, if such data become available, "it would be an option to supplement the results of cigarette testing using this [proposed] method with results based on other carefully-chosen fabrics."[51]

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[48] See id., pp. 12-13.

[49] 1993 NIST Report, p. 32 (emphasis added).

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In sum, substantial research demonstrates that the proposed NIST tests have not been shown to measure cigarette ignition propensity reliably or consistently. Indeed, the research demonstrates that the proposed NIST tests may actually be biased against cigarettes that would show less ignition propensity over the full range of consumer-available upholstery fabrics. No test method can be considered valid unless it takes account of real-world environmental conditions, such as air flow, and the varying ignitability characteristics of different upholstery fabrics.

## III. THE CPSC STUDY OF ACTUAL FIRES

In order to develop real-world data based on actual fires, the 1990 Act directed the CPSC to "design and implement a study to collect baseline and follow-up data about the characteristics of cigarettes, products ignited and smokers involved in fires . . . ." (1990 Act, § 2(b)(1).) The results of this study cast further doubt on the validity of the tests developed by NIST.

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[50] Id., p. 32.

[51] Id., pp. 100-01.

The CPSC's Fire Incident Study examined the physical characteristics of commercial cigarettes reportedly involved in 564 fires that occurred from December 1991 through December 1992 in eight major United States cities. The characteristics of the cigarettes were determined from proprietary information provided by cigarette manufacturers to the CPSC, including values for each of the cigarette design variables upon which NIST had focused (tobacco density, cigarette paper porosity, cigarette paper additives, and cigarette circumference). The study thus tested the validity of the NIST claim that "there will be a real-world benefit in moving toward cigarettes which perform well in the two test methods developed here."[52/]

The study found little connection between actual fires and cigarette characteristics, including those identified in NIST's research. For example, the cigarette variable that NIST had reported to be most important (tobacco density) was found not to have had any significant correlation with real world fire incidence.[53/] In addition, cigarette circumference and the presence of citrates in cigarette paper also were found to have no significant correlation with fire incidence. These findings

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[52/] 1993 NIST Report, p. ix.

[53/] Cigarette Fire Incident Study, CPSC Draft Analysis Report, April 1993, p. 24.

are entirely consistent with the JV's findings that the properties of the cigarette are secondary to those of the substrate.[54]

Even as the Fire Incident Study calls into question the real-world validity of the NIST research and proposed test methods, it also shows that demographic factors far outweigh cigarette design variables as risk factors for actual fires. Gender, education, and income each were found to have far greater statistical correlations with real-world fire incidence than cigarette characteristics.[55] The finding that real-world fire rates are highly correlated with demographic and behavioral patterns suggests that the most effective way to address those fires -- as well as fires from all causes -- is through such programs as improved fire safety education and expanded use of smoke detectors.[56]

## IV. THE "PERFORMANCE DATA" DEVELOPED BY NIST DO NOT ESTABLISH COMMERCIAL FEASIBILITY

After devising its Mock-Up Ignition and Cigarette Extinction test methods, NIST applied those tests to a sample of currently marketed commercial cigarettes. According to the 1993 NIST Report, the results of that "performance testing . . . demonstrate the utility of the method[s] for routine testing of production cigarettes."[57] It was in light of these test results that a majority of the TAG concluded "that sufficient technology and information is available to deem practical the development of a performance standard to reduce cigarette ignition propensity."[58]

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[54] The only TSG cigarette variable reported to have any statistically significant correlation with real-world fires was paper porosity. (*Id.*) It should be noted, however, that the limited sample size prevented the CPSC from conducting the full statistical analysis that ordinarily would have been appropriate.

[55] *Id.*, p. 30.

[56] It should also be noted that upholstered furniture was reported to be the material first ignited in only 25 percent of the 564 fires. The materials first ignited in the other 75 percent of those fires included mattresses and bedding materials, trash, boxes, bags, and papers. (*Id.*, p. 41.) The NIST test methods were developed without any consideration of the materials involved in such fires or the conditions under which they occur.

In fact, the performance data generated by NIST confirm the serious flaws of the proposed test methods and shed little light on whether cigarettes of reduced ignition propensity can be developed or would be commercially feasible.

## A. The Performance Data Generated for Commercial Cigarettes Are Not Meaningful

NIST applied its proposed test methods to two sets of cigarettes. The first set was composed of fourteen "best selling brands," representing 38 percent of the market as of 1990. These cigarettes did not vary widely in their physical characteristics. The second set was composed of six brand styles chosen because, due to their different physical parameters, they were expected to perform better on the cotton ducks selected by NIST. The common denominator of these six packings was reduced circumference.

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[57] 1993 NIST Report, p. G-1.

[58] The TAG's members were chosen to represent various organizations rather than on the basis of any technical qualifications. Aside from the tobacco industry representatives and the NIST researcher who chaired the group, most did not have scientific backgrounds.

Under the artificial test conditions discussed above (no air flow, strong heat-sink substrates, and flat test configurations), the fourteen cigarettes were found consistently to ignite the most ignition-resistant substrate (duck #4 over polyethylene film) and to burn their full length on 15 layers of Whatman Filter Paper. This is hardly surprising because, as noted earlier, the NIST tests were designed to produce a high percentage of ignitions by these cigarettes.[59] In contrast, the six reduced-circumference packings showed "varying degrees" of ignition propensity on both tests.[60]

These "performance testing" results do not demonstrate the utility of the proposed test methods, however, and they certainly do not establish the feasibility of a cigarette ignition propensity performance standard. In the first place, the differences in the test results between the two categories of cigarettes tested by NIST were not consistent,[61] and interlaboratory reproducibility (a critical factor in light of the poor reproducibility of the tests) has not been investigated.[62] More important, the differences rest primarily on results produced by a single substrate -- cotton duck #4 (over polyethylene film). For the reasons explained in Part II above, the validity of those results is extremely limited, if not misleading.[63]

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[59] In fact, one of the criteria relied on by NIST to select the cotton ducks used in the Mock-Up Ignition Test was to "allow discrimination" against popular commercial cigarettes. (April 23, 1992, Log of Meeting, CPSC Directorate for Engineering Sciences, pp. 5-6.)

[60] 1993 NIST Report, p. G-2.

[61] For example, of the five "reduced ignition propensity" cigarettes identified by NIST in Table G-2 of its Report, the least ignition-prone cigarette on the #6 duck was the second most ignition-prone cigarette on the #4 duck; the most ignition-prone cigarette on the #6 duck was tied with one other cigarette as the least ignition-prone cigarettes on the #4 duck; and one of the two least ignition-prone cigarettes on the #4 duck was tied with one other cigarette as the most ignition-prone cigarette on the 10-layer and 15-layer filter paper substrates.

### B. The Commercial Feasibility of Developing Cigarettes Having Reduced Ignition Propensity Has Not Been Established

The 1987 TSG report concluded that the most that could be said with respect to commercial feasibility was that the development of cigarettes with reduced ignition propensity "may be commercially feasible."[64] That conclusion left open, of course, the possibility that reducing cigarette ignition propensity also might prove not to be feasible. No evidence has emerged since 1987 that would justify changing the TSG's conclusion concerning commercial feasibility. Indeed, if anything, more recent data provide additional support for the

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[62] *Id.*, p. G-3.

[63] Further evidence of the potentially misleading nature of tests using cotton duck is provided by the results of a study by one of the JV's members in which cigarette circumference was varied from 21 mm to 27 mm and all other design variables were held constant. Using the same three fabrics that were used to develop the 1987 TSG rankings, this study found that reduced circumferences produced no significant decrease in ignitions. In fact, on other fabrics, reduced circumference was actually found to produce increased ignitions. *See* Technical Overview, p. 4. Additionally, among the five experimental cigarettes that have been tested by NIST using the proposed Mock-Up and Extinction tests, the cigarettes that incorporated reduced circumference were the two worst-performing prototypes.

[64] 1987 TSG Final Report, p. 4 (emphasis added).

TSG's refusal in 1987 to reach any conclusion on the important issue of commercial feasibility.

Although not requested to do so by the 1990 Act, a majority of the TAG concluded, based upon the limited test of commercial cigarettes described above, that it is feasible to produce and sell cigarettes having reduced ignition propensity. That conclusion is unfounded for several reasons.

First, the cigarettes said by NIST to have relatively low ignition propensity currently account for less than one percent of the market, indicating acceptability by very few smokers. Second, consumer tests, in which smokers have been asked to evaluate prototypes designed to have reduced ignition propensity based on the TSG rankings, consistently have found those prototypes to be unacceptable.[65/] Third, for all of the reasons discussed above, there is no way of knowing whether the few commercial cigarettes that performed better than more popular commercial products on the cotton duck used in the primary NIST test can actually be said to have reduced ignition propensity. Because of the many deficiencies in the NIST tests, the limited results that NIST has reported for commercial products are essentially uninterpretable.

The latter observation is, of course, decisive. The comments in the TAG report concerning commercial feasibility depend entirely upon acceptance of the assumption that the NIST tests provide a reliable and reproducible approach to measuring

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[65/] See Technical Overview, p. 16.

ignition propensity in the real world. Inasmuch as that assumption is incorrect, comments based upon that assumption are meaningless.

C. "Health Effects" Concerns Have Not Been Resolved

In its 1987 Report to Congress, the Interagency Committee (comprised of representatives of the CPSC, the U.S. Fire Administration, and the Department of Health and Human Services, or "DHHS") cautioned that "the commercial feasibility and health implications of developing a less fire-prone cigarette are undetermined and will remain that way until such time as potentially marketable varieties are developed, test marketed and analyzed for toxicity."[66] The 1990 Act therefore directed the CPSC, in consultation with DHHS, to develop information on changes in the toxicity of smoke and resultant health effects from cigarette prototypes designed to have reduced ignition potential.[67] As summarized by the CPSC staff, "[t]he major concern is that a small increase in the risk of toxicity of these cigarettes might result in a large increase in human toxicity. If this occurred, the toxicity might offset the benefits that might be achieved from the reduction of fires."[68]

Pursuant to the 1990 Act, the CPSC appointed a panel of consultants that prepared a report entitled "Toxicity Testing

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[66] Report of the Interagency Committee On Cigarette and Little Cigar Fire Safety, p. 3.

[67] 1990 Act, § 2(b)(1).

[68] Transcript of January 29, 1993, TAG Meeting, pp. 251-52.

Plan for Low Ignition Potential Cigarettes." The report calls for a complex four-tiered battery of chemical tests, in vitro biological assays, animal tests, and human smoking behavior assessments to be applied to each commercial prototype cigarette modified to have reduced ignition potential before it may be placed on the market.

Because of time and the severe funding limitations imposed by the 1990 Act, the proposed plan was not intended to be comprehensive. Neither does it address the critical issue of defining an acceptable level of performance. Extensive further analyses also will be required to assess the appropriateness of many of the specific tests that have been proposed, as well as how they are applied and interpreted. If a suitable plan can be fully defined (a process that will require extensive additional studies), it can be employed only after a valid ignition propensity test method has succeeded in identifying prototypes that have reduced ignition propensity and potential commercial acceptability.[69] In short, there has been no change in the status of this issue since the 1987 Interagency Committee Report.

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[69] The only application of the proposed testing plan to date has been preliminary measurements of "tar," nicotine, and carbon monoxide yields of two experimental prototypes, two popular commercial cigarettes, and a "reference" cigarette whose ignition propensity has not been studied. The experimental cigarette that produced the fewest ignitions of any commercial or experimental cigarette tested by the NIST method was reported to have "tar" and carbon monoxide yields representing approximately a 50 percent increase over the two commercial cigarettes.

## V. OTHER PROVEN AND EFFECTIVE OPTIONS FOR REDUCING THE NUMBER OF ACCIDENTAL FIRES INVOLVING CARELESSLY HANDLED CIGARETTES ARE AVAILABLE

The difficulties of developing a reliable test for measuring cigarette ignition propensity -- coupled with the unknown risks involved in arbitrarily changing the design of cigarettes -- raise the important issue of whether attempts to modify cigarette design are the most reasonable or efficient way to reduce the incidence of accidental fires originating in upholstered furniture and mattresses. At best, changes in cigarette design based on the NIST tests would affect only a very small percentage of fabrics. Other options for reducing the number of such fires are available, and have been shown to be highly effective.

Furniture flammability standards in particular offer a proven way to reduce accidental fires involving cigarettes. Since the implementation in 1977 of mandatory furniture flammability standards, per-capita cigarette-related furniture fires and fire deaths in California -- the only state to have such standards -- are now more than 80 percent below the rest of the nation. The National Association of State Fire Marshals ("NASFM") recently petitioned the CPSC to promulgate national furniture flammability standards based on those of California, noting that deaths due to cigarette fires have been nearly eliminated in that state.[70] As the NASFM petition also noted, the only current national furniture-flammability program is a purely voluntary program that has limited participation by domestic upholstered furniture makers and limited effectiveness.

The potential effectiveness of furniture flammability standards is highlighted by the consistent findings, noted earlier, that the presence of alkali metal ions plays a "pivotal" role in fabric ignitablity.[71] If there is one area in the complex field of cigarette/substrate ignition research in which all studies point to the same conclusion, it is that removal of these smolder-promoting ions from fabrics will greatly reduce, if not eliminate, furniture fires.[72]

Unfortunately, as NIST pointed out in its 1987 Report, "[i]n spite of the clear evidence of the importance of this factor, neither . . . the fabric finishers nor the upholstered furniture manufacturers seem to have taken steps to reduce alkali metal ion concentration and thus to increase cigarette ignition resistance."[73] The removal of these ions has been shown to be readily achievable simply by rinsing raw cotton or finished fabrics in water.[74] Thus, there is every reason to believe that the simplest and most effective way to reduce the number of upholstered furniture fires involving carelessly handled cigarettes would be merely to require that upholstery fabric materials be rinsed before they are sold.[75]

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[70] The NASFM represents fire marshals (or state officials with an equivalent designation) in all 50 states. NASFM has advised the TAG and NIST that the proposed NIST tests cannot be used to develop cigarette performance standards without extensive further research to confirm their validity.

[71] 1987 NIST Report, pp. 10, 66, 68-69, 223.

[72] *See*, *e.g.*, McCarter, "Smoldering Combustion of Cotton and Rayon," 4 *Journal of Consumer Product Flammability* 346-58 (1977); Donaldson, Yeadon & Harper, "Smoldering Phenomenon Associated with Cotton," 53 *Textile Research Journal* 16-64 (March 1983); Krasny, "A Simple Method for Reducing Cigarette Caused Upholstery Fires," 24 *Textile Chemist and Colorist* 12 (Nov. 1992).

[73] 1987 NIST Report, p. 66.

A second avenue to enhanced fire safety is improved education. Since Congress first authorized the study of cigarette ignition propensity, the number of fires attributed to careless smoking has declined substantially on a nationwide basis. From 1980 through 1991, the number of structural fires of all kinds attributed to careless smoking declined by nearly 58 percent, and the number of fire deaths attributed to careless smoking fell by a nearly parallel 45 percent.[76] Better fire safety education -- including promotion of and greater use of smoke detectors -- appears to be largely responsible for these dramatic changes.[77]

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[74] The ease of removing the ions was illustrated by the 500 fabric study discussed earlier. Of the 145 commercial fabrics found in that study to be potentially ignitable, 124 became non-ignitable after a simple rinsing in a commercial laundromat. (Technical Overview, p. 9.) It is noteworthy that NIST found that the cotton ducks it obtained also became non-ignitable after rinsing, despite their high "as-received" levels of potassium ions.

[75] In addition, because ignitability is a function of both the fabric and the underlying padding, and because some paddings are more fire-resistant than others, enhanced fire protection also can be obtained by requiring the use of certain paddings. The United Kingdom, for example, has adopted this approach. Like California, the United Kingdom has a significantly lower fire rate than does the United States.

[76] Schaenman & Frazier, "Trends in Smoking Materials Fires: 1991 Update" (TriData Corporation, April 1991); Schaenman & Frazier,"Trends in Smoking Materials Fires: 1993 Update" (TriData Corporation, April 1993).

The tobacco industry began to conduct cigarette ignition propensity research before the 1984 Act was passed, and it will continue to conduct such research in the future. To date, however, the industry's research shows that, because there are no assurances that modifying cigarette designs would not actually produce an increase in fires or have other unintended adverse consequences, mandating cigarette design modifications offers one of the least practical alternatives for improving fire safety.

## CONCLUSION

At the outset of NIST's work under the current Act, it was widely thought that the development of a standard test method would be a relatively easy task, largely limited to developing controlled ion treatments for any of several potential test fabrics. As NIST's 1991 retest of experimental cigarettes and its tests of treated cotton ducks soon demonstrated, however, the 1987 rankings of experimental cigarettes proved to be unreliable and the effort to account for the range of environmental factors that affect cigarette ignition propensity is by no means an easy task.

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[77] Voluntary changes in commercial furniture construction and federal mattress fire safety standards may also be responsible for part of this decline. Mattresses in particular (unlike upholstered furniture) have been subject to federal flammability standards enforced by the CPSC since 1977.

As research has broadened to address the reasons for the unreliability of the 1987 TSG rankings, it has become apparent that studies of commercial fabrics in common use and of the environmental conditions that may be anticipated in residential settings are essential predicates for a predictive standard test method. Given the information currently available, there is substantial reason to doubt that any test method that relies on a single fabric or a single set of test conditions can reliably determine ignition propensity across the wide array of fabrics and environmental conditions found outside the laboratory. It is important to remember that cigarettes do not have an intrinsic "ignition propensity." Instead, ignition propensity is a phenomenon that depends primarily on the fabric and padding used in the test, the geometry of the test mock-up, and environmental conditions (such as air flow and humidity).

By failing to take these considerations into account and limiting its research in order to propose a test method within the time constraints imposed by the 1990 Act, NIST has developed test methods that are irrelevant to real-world fire scenarios. Their 40 percent range of variability alone renders the proposed tests impractical, and suggests that critical aspects of ignition physics or other unknown variables have not been identified or resolved. Moreover, there are consistent indications that the proposed tests, if adopted, would favor cigarette designs that could actually have increased ignition propensity in real world settings.

In short, the test methods proposed by NIST have little relevance to cigarette-ignition potential under realistic circumstances and cannot be considered predictive of cigarette ignition propensity. Accordingly, the NIST test methods should not be accepted as the basis of a cigarette ignition propensity performance standard.

Mrs. COLLINS. Thank you.

On the one hand, we have heard independent Government experts tell us that it is feasible to develop a cigarette that is fire safe. On the other hand, we have the cigarette industry telling us that it is not feasible, despite the existence of documents from one of the major companies which seems to show that it is, and I am concerned because the industry even expresses concern about the health hazard of fire-safe cigarettes.

Now the subcommittee has a responsibility to decide which side to believe and whether to depend on unbiased Government experts or the cigarette industry, and it is going to be quite a chore to try to sort all that out.

One of the things that bothers me and that I have just been handed is an Associated Press story that was written on March 25 of this year, and it quotes you—well, first of all, this is Washington, DC. AP. It says cigarettes advertised as lower nicotine actually have stronger levels, and one company even created a low nicotine snuff to lure teenagers and then graduate them to more potent brands, the Government charged Friday, and then it goes on to say in an often angry exchange in testimony before Congress, the tobacco industry denied that it manipulates nicotine levels or that tobacco products are either addictive or dangerous, and then they quote you, Congressman Whitley, which says, "We don't think nicotine does any harm."

"Tobacco Institute spokesman Charles Whitley said that when told that the Government blames smoking for 400,000 deaths a year, mostly from lung cancer", it says that you said—and I am quoting—"I deny that cigarettes cause cancer and are not safe." That is what they say you said. Did you say that?

Mr. WHITLEY. Madam Chairwoman, I think what you are looking at there is a situation where I was asked a series of questions in rapid fire order by Congressman Synar with a demand that, "You answer the questions yes or no", that he gave me no.

Mrs. COLLINS. No, you didn't do it yes or no. You said, "I deny that cigarettes cause cancer and are not safe." It quotes you as saying those very words.

Mr. WHITLEY. He said, "Do you say that they cause cancer? Answer yes or no." I said there is no evidence that they cause cancer. There is—there is a statistical risk in the use of cigarettes in relation to cancer, heart disease, emphysema, and other things, and we do not deny that in the industry that there is a statistical risk associated with cigarettes and other tobacco products. I did not deny that now, I do not deny that now.

Mrs. COLLINS. Do you think that smoking causes cancer?

Mr. WHITLEY. I think there is a statistical risk of cancer if you use cigarettes.

Mrs. COLLINS. Do you think that it can cause or certainly helps to create a heart disease condition?

Mr. WHITLEY. I think there is certainly a risk that it may.

Mrs. COLLINS. Do you think that nicotine is addictive?

Mr. WHITLEY. No. I think nicotine, like a lot of other products, is habit forming, but I think "addictive" is an awfully strong word and is the wrong word to apply to the cigarette habit.

Mrs. COLLINS. So it just should be "habit forming" instead of "addictive?" The word should be just "habit forming" instead of "addictive?"

Mr. WHITLEY. Well, I think that would certainly be a more appropriate description of the cigarette habit.

Mrs. COLLINS. Why do you think some people have such a terrible time stopping smoking cigarettes?

Mr. WHITLEY. Ma'am?

Mrs. COLLINS. Why do you think some people have such a terrible time giving up cigarettes?

Mr. WHITLEY. Well, you know, people have a difficult time giving up a lot of pleasurable habits. Over 50 million Americans, half of those who ever smoked, have given up smoking cigarettes, and 90 percent of those without any outside help.

Mrs. COLLINS. Unfortunately, as a result of the rescheduling of this hearing which had to be done because of a funeral that I attended yesterday, Dr. Spears wasn't able to be here to accompany you, and I am sure he thoroughly enjoyed his testimony before the Health and Environment Subcommittee and really wanted to be here with us today.

But a few weeks ago he testified that the industry doesn't set any nicotine levels for particular brands of cigarettes, yet it was revealed last week that he wrote a report in 1981 that, according to the last Thursday's Washington Post, quote "indicates that companies have long manipulated the levels of nicotine in cigarettes."

Now why do you think it is that nobody believes anything the cigarette industry says any more?

Mr. WHITLEY. Well, Ms. Collins, Dr. Spears explained that statement in the hearing last week before the Waxman subcommittee.

Mrs. COLLINS. Well, I wasn't there, so you tell me how he explained it, please.

Mr. WHITLEY. Well, I don't have his answer with me, Madam Chairwoman.

Mrs. COLLINS. How would you explain it?

Mr. WHITLEY. Well, I would explain it on the basis that clearly in the manufacturing process of cigarettes the nicotine level varies depending on what you are manufacturing the cigarette for. If you are trying to manufacture a cigarette with low tar, then when you lower the tar level, the nicotine level is automatically reduced along with it. In the manufacturing process, nicotine follows tar, and the market on cigarettes in recent years has been for lighter cigarettes, and when you lighten the tar, lighten the taste, then of course the nicotine level is adjusted accordingly, and the companies have the capacity to blend tobacco, to reduce the tar levels, and that reduces the nicotine level. That is the answer to the question.

Mrs. COLLINS. Mr. Greenwood.

Mr. GREENWOOD. Thank you, Madam Chairwoman.

Mr. Whitley, you said that your industry opposes the bill in its present form, and you talked about some relatively minor changes, in terms of how quickly the administration would be required to promulgate the standards. What would be, in your view, the impact if this legislation became law? Would, in fact, the industry scramble to develop cigarettes that are less likely to ignite and still be able to have some appeal to consumers? Or, do you think that the industry would not respond, and, in fact, it would be impossible to produce a cigarette that is more safe and still appeals to the consumers?

Mr. WHITLEY. Clearly, Mr. Greenwood, the industry will make every effort to produce a marketable product to meet whatever standard may be adopted. But if the bill should pass in its present form and it presupposes, I think, in its present form, the use of the cotton duck test that has been developed by NIST in connection with its recent research, the industry does not possess at the present time the technical capability to put a cigarette on the market that would consistently and successfully pass that cotton duck test and which would be acceptable to consumers. No company has done any research that indicates that they have such a cigarette. You have to do that with the type of thing, not necessarily to duplicate the cigarettes that you have looked at up on the dais, but it has to be that type of manufacturing product, and again it sort of speaks for itself, if fewer than 1 percent of smokers are smoking those cigarette, it tells you what their consumer acceptability is.

Mr. GREENWOOD. That is the point I want to get to. Is the bigger problem making the cigarette that is less likely to ignite, or is that you believe and it is just hard to do that and——

Mr. WHITLEY. Well, it is both, Mr. Greenwood. What the industry is trying to avoid doing is being forced in the interest and in the name of producing a less ignition-prone cigarette, having to produce a cigarette that really is not any less ignition prone with real world fabrics than what is on the market now and yet has lost a great deal of its consumer acceptability. That is the concern of the industry, and even the CPSC report itself, as I just read a while ago, indicates that using Dr. Gann's test method and requiring cigarettes to be manufactured does not guarantee that you reduce fires in real world situations.

Mr. GREENWOOD. Let's assume that we don't use the cotton duck test. Let's assume that the industry worked with the administration to develop the test that you thought fairly tested the ignition likelihood for cigarettes. Is it your testimony that you can or cannot develop a safer cigarette?

Mr. WHITLEY. Well, we think it can be done, but we don't think you get there with this test method.

Mr. GREENWOOD. I understand that, but your testimony is that you can make a cigarette less likely to ignite?

Mr. WHITLEY. You can do that, and possibly—possibly you can do that in a way that will still produce a product that is commercially acceptable. It has not been demonstrated at all.

Mr. GREENWOOD. So that is the bigger question mark. You are not questioning whether you can produce a safer cigarette——

Mr. WHITLEY. That is right.

Mr. GREENWOOD. You are questioning whether you can produce a safer cigarette that anybody will want to buy.

Mr. WHITLEY. That is right.

Mr. GREENWOOD. That is the tougher challenge for you.

Mr. WHITLEY. That is right.

Mr. GREENWOOD. Thank you for your testimony.

Thank you, Madam Chairwoman.

Mrs. COLLINS. Well, you of all people know what these bells mean, so we are going to recess again for about 10 minutes and come right back.

Mr. WHITLEY. Thank you, Madam Chairwoman.

[Brief recess.]

Mrs. COLLINS. The subcommittee hearing will reconvene.

I have just been notified by staff that you wanted Mr. Townsend to testify today?

Mr. WHITLEY. Yes.

Madam Chairwoman, I think I gave a technically incorrect response to a question from Mr. Paxon regarding the testing that the companies did of the five brands in real world fabrics, and I have here with me Dr. David Townsend who is a scientist with R.J. Reynolds who can correct that, and while he is testifying, Madam Chairwoman, it might be appropriate to let him describe the contact that Ms. Brown said was made by a company executive asking about a unilateral action by one company, because he is the executive who made that contact and he can repeat that conversation. So I would like to yield at this time to Dr. Townsend.

Mrs. COLLINS. Sure.

Dr. Townsend.

## STATEMENT OF DAVID E. TOWNSEND

Mr. TOWNSEND. Thank you Madam Chairwoman.

First of all, it seems that the discussion at hand today is going right to the central core of, is it possible to develop a cigarette that is both consumer acceptable and exhibits improved fire safety.

Let me be clear that, using cigarette construction characteristics that have been thought to reduce ignition propensity, we find that as we change the cigarette using those construction characteristics to reduce ignition propensity, consumer acceptability goes hand in hand.

Very clearly, from R.J. Reynolds' perspective, from my involvement in product development and the ignition propensity issue, we clearly do not know how to make a cigarette that exhibits marked reduction in ignition propensity and is consumer acceptable.

Now let me turn to those five commercial cigarettes. In understanding the situation with those five commercial cigarettes, there are really several points, so if you will allow me to respond fully to the subcommittee, it will take maybe 2 minutes. Thank you, Ma'am.

First of all, to the heart of the matter is, what does the present NIST test really mean? It is a test that can show some discrimination among some cigarettes. Does that mean that test, in fact, reflects a cigarette's ability to ignite furniture in the real world? Clearly, in spite of the allegations against the industry, there is sound scientific evidence that the NIST test, in fact, does not, in fact, bear that connection to the real world.

Let me, for example, show the first point. The industry conducted a very large-scale fabric survey where we randomly selected 500 commercial fabrics from the marketplace, conducted extensive ignition testing of the those 500 fabrics, and quite simply found the following.

Of the 500 fabrics, only 145 fabrics showed any ignition even with what is thought to be a high ignition propensity cigarette. Of those 145, only 21 showed the same ranking of cigarettes as found by the NIST test. In contrast to that, 41 percent of those 145 fabrics, or 60 fabrics, showed a ranking of cigarettes that was different than that found by the NIST test, and in fact 64 fabrics could not discriminate among any of those cigarettes.

Now with that information in hand, of course clearly we question whether the cotton duck fabric used in the NIST test in fact reflects the large variety of ignitable behaviors of fabrics found in the marketplace. Another example of exactly this crucial issue is the five commercial cigarettes that we keep talking about this morning.

What we have here in this chart is, in fact, data from the National Institute of Standards and Technology using the NIST test as specified, again, using cotton duck fabrics. The bars on the right-hand side are 5 of the 14 best selling products that exhibit high ignition results on the test. The six cigarettes on the left-hand side, in fact, are the cigarettes in question here today, and there is a reduction in the ignition propensity as measured by that NIST test.

However, if you go to the marketplace and you randomly select a large number of fabrics, commercial upholstery furniture fabrics in the marketplace, and you do exactly the same NIST test, only replace the cotton duck for these commercial fabrics, now, in fact, we see the five best selling products show no statistically significant difference compared to the six unusually constructed products. Again, another piece of evidence that we believe clearly shows that the meaningfulness of the NIST test to real world fires, to real fire safety, is clearly questionable.

Thank you.

Mr. TOWNSEND. Another example of exactly this point is, we at R.J. Reynolds have conducted extensive research in cigarette characteristics vis-a-vis ignition propensity and we have analyzed and evaluated cigarettes found throughout the world. Two important pieces of information have come to light.

First, if you survey cigarettes found throughout the world, we found only two cases to date where any cigarettes have shown measurable reduction in ignition propensity as measured by the NIST test. All the other cigarettes behave exactly the same as commercial cigarettes and products, the best selling products. While there is no difference among those cigarettes, there is as much as a factor of three or four in the fire death rates among those countries.

So again, the NIST test cannot show differences when, in fact, there are major differences among countries throughout the industrialized world.

Another piece of information is very interesting, if you focus on those two products, that we, in fact, found significant and major reductions in the NIST test. These are commercial products. They were found in Hungary. Those two products represents more than 70 percent of the Hungarian market. Those products showed measurable and large reductions in ignition propensity. Hungary has a much higher fire death rate than ours. Over 40 percent of the fire deaths in Hungary are attributable to careless smoking, whereas in this country in the neighborhood of 25 percent of fire deaths are attributable to smoking. So a reduction in the NIST test has not been borne out in actual practice in Hungary.

And then, of course, it has been mentioned that those five commercial cigarettes, in, fact, have a low market share. That is absolutely true, and our consumer research within R.J. Reynolds, the only company I can speak about for such proprietary information, clearly shows that long skinny cigarettes are unacceptable to most smokers. If the objective of this bill is to only allow the marketing of those cigarettes, then that does severely restrict the consumer acceptance of those products and is a major, major impact.

Mrs. COLLINS. Well, now, let me ask you a question.

Mr. TOWNSEND. Yes, Ma'am.

Mrs. COLLINS. Has there been equal marketing of long, skinny cigarettes—has the marketing of long, skinny cigarettes been equal to that of other cigarette brands and fatter cigarettes and shorter cigarettes and what-have-you?

Mr. TOWNSEND. By what measure?

Mrs. COLLINS. By any measure.

Mr. TOWNSEND. By any measure?

Mrs. COLLINS. I mean have you marketed it as extensively as you have your others? Have these been around as long? You know, all kinds of questions come to mind when you think about the long, skinny cigarette. There used to be cigarettes that were brown some time ago, there used to be some that were in square boxes some time ago, and all these sorts of things. Do you advertise as widely for the long, skinny cigarettes as you do for the regular ones? Do you have a picture of a camel in some blue jeans on these cigarettes or what-have-you? Marketing is marketing is marketing.

Mr. TOWNSEND. Yes, Ma'am, I think I understand your question.

Mrs. COLLINS. OK.

Mr. TOWNSEND. Clearly, if a cigarette is a very, very small portion of the market, we will not spend the same level of money marketing that product. So these particular products, while they contribute less than 1 percent of the market, they are not advertised and marketed very heavily.

Mrs. COLLINS. OK.

I just saw Dr. Gann sitting up there just writing away.

Would you want to say something? Dr. Gann, do you want to come back to the witness table? Do you want to defend your study just a little bit? And then I am going to get on with the rest of these witnesses.

Mr. GANN. I am sorry?

Mrs. COLLINS. Did you want to defend your statement and your study just a little bit in light of what Dr. Townsend said, or do you want to let it go at that and just leave us to conjecture?

Mr. GANN. I can't address the most recent data where the industry has mentioned data on these five cigarettes with other fabrics since I haven't seen the data.

Two independent analyses have been performed on the industry data which claims to show that most fabrics give results different from the cotton ducks. Both of those analyses came up to the conclusion that 80 percent of the fabrics in the study give the same result. So I think we have an analysis credibility problem here.

I think the statement that was made that because Hungarian cigarettes have a lower measured ignition potential on the NIST test and the fire death rate is higher in the country, the test is no good, is an exercise in logic that I don't think even a freshman would try and live with. I mean that defies belief.

Mrs. COLLINS. Well, this seem seems to be—we are working on the crime bill, and these amendments are going hot and fast. So I am going to try to get a couple more questions in if I can, and we will have to submit the rest of our questions, Mr. Whitley, in writing.

In your statement you suggest consideration of a mandatory furniture flammability standard. You know, when I read that, I couldn't help but think that maybe you want to put the shoe on the other guy's foot and make the furniture industry responsible for saving the lives of kids. Then the question arose in my mind, how does the average life of a piece of furniture compare with the shelf life of a cigarette? Why would you want to say, well, you know, the furniture companies ought to do something about their fabrics, rather than we ought to do something about our cigarettes?

Mr. WHITLEY. Madam Chairwoman, there are a wide range of variables that affect fires. Obviously, the fabric is one. We do not have any mandatory standards in effect except in the State of California, and the California experience has been that since they put mandatory standards into effect, that cigarette fires and other house fires in California are 80 percent lower than they are anywhere else in the Nation, which is pretty good proof of the pudding in that regard.

One of the fire organizations has petitioned the CPSC to move under its existing jurisdiction to promulgate standards, compulsory standards for fabrics.

We simply don't think that in a vacuum you can address only the cigarettes without also looking at fabrics and seeing what easy-to-do, inexpensive modifications might be made on fabrics as well.

Mrs. COLLINS. I understand that the petition that you are referring to was from the National Association of State Fire Marshalls. Is that correct?

Mr. WHITLEY. That is correct.

Mrs. COLLINS. Did that person used to work for the Tobacco Institute?

Mr. WHITLEY. That person?

Mrs. COLLINS. Or the legislative people used to work for that group?

Mr. WHITLEY. Well, there is a man who works for the National Association of Fire Marshalls who used to be a consultant for us, and he has consulted for us and for a number of other organizations on the subject of fire and fire safety. That is his area of expertise.

Mrs. COLLINS. I am particularly concerned about fire in lower-income areas, and, according to the CPSC, poor families are more likely to have cigarette fires than wealthier families. How often do you think poorer families buy new furniture?

Mr. WHITLEY. I would suspect that they probably don't buy new furniture as frequently as higher-income families.

Mrs. COLLINS. Well, I imagine they buy cigarettes fairly regularly if they smoke.

Mr. WHITLEY. That is probably the case, Madam Chairwoman.

Mrs. COLLINS. And it would seem that if we did something about cigarettes that start fires, that perhaps the likelihood of them having fires that might destroy their children or themselves would be lower.

Mr. WHITLEY. We are willing to do that, Madam Chairwoman, but we——

Mrs. COLLINS. Well, you haven't done it, and Mr. Moakley testified that he has been trying to get something done for a very long period of time and nothing has happened.

Mr. WHITLEY. We are reluctant to agree to or to accept modifications to our product that we do not have any reason to believe are going to reduce fires. That is one of our concerns.

Mrs. COLLINS. The same way you don't believe cigarettes cause cancer.

Mr. WHITLEY. Well, Madam Chairwoman, I believe I said that we acknowledge the fact that there is a statistical risk associated with the use of tobacco products and a correlation with certain diseases.

Mrs. COLLINS. If you had your druthers, would you rather have the CPSC involved here, or would you rather have FDA involved?

Mr. WHITLEY. Well, you know, I guess that is, would you rather be executed by lethal injection or would you rather be shot? If it weren't for the honor of the thing, I would just as soon pass up either one, Madam Chairwoman.

Mrs. COLLINS. Good answer. With that, this hearing is adjourned. Thank you for coming.

[Whereupon, at 1:45 p.m., the hearing was adjourned.]

[The following material was received for the record:]

## STATEMENT OF

## THE AMERICAN TOBACCO COMPANY

**Before The Subcommittee on Commerce**
**Consumer Protection and Competitiveness**
**Committee on Energy and Commerce**
**U.S. House of Representatives**
**April 19, 1994**

Madam Chair and distinguished members of the Subcommittee. Thank you for the opportunity to participate in these hearings and to share with you some of our research findings. I am Dallas O. Pinion, Research and Technical Service Manager at the research center of The American Tobacco Company where we have conducted research pertaining to the "fire safe" cigarette issue. I hold a Doctorate from Duke University and served as a member of the 1990 federal study group on cigarette fire safety.

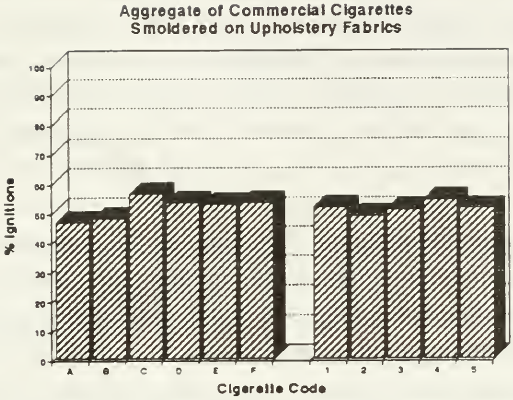
Since the release in 1993 of the report prepared under the Fire Safe Cigarette Act of 1990 by the National Institute of Standards and Technology ("NIST"), American has performed further research on two of the most critical areas for the establishment of any cigarette fire safety standard: (1) does the NIST Test Method predict how cigarettes will perform in the real world of upholstered furniture; and (2) does the test proposed by NIST produce results that are repeatable and reproducible. For the benefit of the Subcommittee, we therefore are submitting this statement to report on the results of our research on these two critical areas as well as to report on the consumer tests we have performed on theoretically "low ignition" cigarettes.

## Ignition Tests on Typical Furniture Fabrics

The 1993 NIST report listed six unnamed commercial cigarette brands which NIST characterized as having reduced ignition propensity (NIST Report., pp. 106-09). According to the NIST Report (p. 106), these six brands had "less than one percent of the market in 1990."

As a result of a recent request by Congressman Moakley, the names of five of those brands have been disclosed. American decided to test these five brands on a random selection of 25 upholstery fabrics obtained through retail upholstery fabric suppliers. (American also tested the sixth brand which was in the NIST report and identified by us as an American product.) The only criterion used in the fabric purchase was that it consist of 100% cellulosic materials such as cotton, rayon, linen, etc -- the upholstered furniture fabrics which are well known to be the most prone to ignite in accidental fires. Another set of five brands that are representative of the more popular commercial brands, constituting around 9% of the market and suggested by NIST to have "high ignition" propensity, was then tested on the same fabrics using the same procedure. All tests were conducted in accordance with the protocol specified by NIST with the exception that actual upholstery fabrics were used in place of the "cotton duck" fabric used by NIST, and no polyethylene film was placed under the fabric.

The results indicate that there is no significant difference between the six commercial brands reported by NIST to have "reduced" ignition propensity and those representing the more popular commercial brands reported by NIST to have "high ignition" propensity. This is true whether they are examined in the aggregate or individually For example, if the test results of the six cigarettes found by NIST to be "low ignition" are compared on an average percent ignition basis with the five cigarettes that are representative of the more popular brands, the average frequency of ignitions is almost identical, 51.4% versus 51.1%, respectively. In fact, the supposedly "low ignition" cigarettes were the higher of the two groups. As shown in Attachment A, this is just as true when comparing on an individual basis each "low ignition" brand type ("A-F") with the popular brands tested ("1-5"). The results are shown graphically in the following bar chart:



Aggregate of Commercial Cigarettes Smoldered on Upholstery Fabrics

These data indicate that the reported NIST Test Method results are not consistent with the behavior of commercial cigarettes on upholstery fabrics likely to be present in potential real-world fire situations.

## Variability of NIST Test Results

All agree that an acceptable cigarette ignition propensity test should be repeatable, reproducible and predictive of actual conditions. For its "primary" test method, NIST has chosen a fabric known as "cotton duck" which it believes replicates such real world conditions. American purchased a bolt of "cotton duck #4" fabric from the same mill as NIST using the same specifications and compared its ignitability, physical and chemical characteristics with the bolt of "cotton duck #4" used in prior NIST-conducted tests.

The results of our research are to be submitted shortly to the Journal of Fire Science for publication. A summary of that research is as follows: The variations from one bolt of "cotton duck" to another bolt manufactured to the same military specifications are such that "cotton duck" is an unacceptable fabric to test for cigarette ignition propensity even if it did not suffer from the other problems described in Mr. Whitley's testimony.

American performed tests following the protocol used by NIST when it conducted a nine-laboratory Inter-Laboratory Study (ILS). Two experimental cigarettes, which had been among the thirty-two types fabricated by the cigarette industry for the Fire Safe Cigarette Act of 1990, were used and were coded as BNHC-21 (503) and FNLN-21 (510). BNHC-21 was one of the five cigarettes used by NIST in its prior ILS, and FNLN-21 was believed to yield similar ignition results and was thus used to confirm data obtained with BNHC-21. These cigarettes were tested twice on each fabric, with each test consisting of 48 replications. The fabrics are coded as Fabric A (New Bolt) and Fabric B ("NIST like" bolt). On the first three days, the same cigarette was tested on both fabrics (denoted below as Fabric $A_1$ and Fabric $B_1$). The test was repeated over the next three days, and the results are shown under Fabric $A_2$ and Fabric $B_2$. The cycle was then repeated for the second cigarette.

As shown in Table I below, Fabric A in both tests ($A_1$ and $A_2$) has markedly fewer ignitions than Fabric B, and this is true for both cigarettes BNHC-21 and FNLN-21:

**Table I. Cigarette Ignition Test Results**
**(Fabric A vs Fabric B)**

| BNHC-21 (503) | | | FNLN-21 (510) | | |
|---|---|---|---|---|---|
| **Result** | **Fabric $A_1$ vs Fabric $B_1$** | | **Result** | **Fabric $A_1$ vs Fabric $B_1$** | |
| **IG** | 4 | 27 | **IG** | 6 | 32 |
| **NI** | 44 | 21 | **NI** | 42 | 15 |
| **SE** | 0 | 0 | **SE** | 0 | 1 |
| | **Fabric $A_2$ vs Fabric $B_2$** | | | **Fabric $A_2$ vs Fabric $B_2$** | |
| **IG** | 4 | 32 | **IG** | 8 | 27 |
| **NI** | 44 | 16 | **NI** | 39 | 21 |
| **SE** | 0 | 0 | **SE** | 1 | 0 |

**IG:- Ignitions NI:- Non-Ignitions SE:- Self-Extinguishments**

For both cigarettes, the differences in the incidence of ignitions (IG) seen between Fabrics A and B are larger than the reproducibility limits placed on the test method by NIST. In other words, the theoretically same type "cotton duck" fabric yields significantly different results using the test method reported by NIST. The disparity occurs because of the inter-bolt variations occurring in the manufacturing processes of "cotton duck". This is another compelling reason why "cotton duck" is not a suitable fabric for a test method which must be replicated again and again.

## Consumer Acceptability of "Low Ignition" Cigarettes

It has been suggested by the television show "60 Minutes" that at least one company (and thus by implication other tobacco companies) has developed a "low ignition" cigarette which is acceptable to consumers. Obviously, American cannot speak for other companies in this area, but it can directly address any implication by the "60 Minutes" broadcast that American has developed such a product.

As it reported at length to the Technical Advisory Group in April 1993, American conducted in 1987 a consumer test of a commercially available brand of cigarettes which were modified in ways previously suggested by the Technical Study Group (TSG) as lowering cigarette ignition. Accordingly, the test cigarette modifications included using low porosity 10 CORESTA paper containing no citrate (similar to paper used on TSG cigarettes) and an increased level of expanded tobacco to decrease density. These changes incorporated three of the four characteristics suggested by the TSG to reduce cigarette ignitions.

The test cigarettes produced abnormally high smoke delivery and resistance to draw (39% and 46%, respectively). Nicotine delivery measured by FTC method was 34% higher. The 10 CORESTA, no citrate paper was electrostatically perforated to reduce smoke delivery into the range of the commercially available brand of cigarette ("control") for consumer testing. However, nicotine delivery and resistance to draw remained higher than the control cigarette by 17% and 27%, respectively.

The test cigarettes were evaluated against control cigarettes by an independent testing agency among 208 smokers in 12 cities. Smokers reported that the test cigarettes were "drier", "did not taste as good", were "harsher", "more bitter" and "harder to draw". Indeed, consumers overwhelmingly rejected the test cigarette at a 99 9% confidence level

A similar type consumer test was performed again in August 1993. A theoretically "low ignition" cigarette was tested against a "control" cigarette presently commercially available. The consumer test results (using 260 respondents this time) were similar to the disappointing results obtained in 1987 At a 99% confidence level, the theoretically "low ignition" cigarette had "worse taste," was "less mild" and was "more harsh, dry and bitter" with a "worse aftertaste" than the "control" cigarette.

American's test surveys therefore do not yet show consumer acceptability for a "low ignition" cigarette. Of course, American is continuing to do research in this area, but its efforts at achieving consumer acceptability have so far proved elusive.

## Conclusion

The issue of a "fire safe" cigarette is a complex one which, as the CPSC has indicated in its August 1993 report to Congress, is not yet as readily solved as NIST might suggest. American's work shows that fabric choice is the main determinant of an ignition test outcome. American looks forward to working with the Subcommittee to see that any legislation adopted will not result in a standard which could lead to the reversal in the decade-long decline in cigarette related fires.

## Attachment A

## Aggregate Ignition Results for Eleven Commercial Cigarettes Smoldered on Twenty-Five Upholstery Fabrics

| CODE | TOTALS | | | PERCENTAGES | | |
|---|---|---|---|---|---|---|
| | IG | NI | SE | %IG | %NI | %SE |
| A | 93 | 104 | 3 | 47 | 52 | 2 |
| B | 95 | 104 | 1 | 48 | 52 | 1 |
| C | 112 | 87 | 1 | 56 | 44 | 1 |
| D | 106 | 94 | 0 | 53 | 47 | 0 |
| E | 105 | 94 | 1 | 53 | 47 | 1 |
| F | 106 | 92 | 2 | 53 | 46 | 1 |
| 1 | 103 | 97 | 0 | 52 | 49 | 0 |
| 2 | 97 | 103 | 0 | 49 | 52 | 0 |
| 3 | 101 | 99 | 0 | 51 | 50 | 0 |
| 4 | 108 | 92 | 0 | 54 | 46 | 0 |
| 5 | 102 | 98 | 0 | 51 | 49 | 0 |

| | |
|---|---|
| IG | **Ignitions** |
| NI | **Non-Ignitions** |
| SE | **Self-Extinguishments** |

**Benjamin/Clarke Associates, Inc.**

10605 Concord Street, Suite 501
Kensington, Maryland 20895
(301) 949-1414

April 15, 1994

The Hon. Cardiss Collins
Chairman, Subcommittee on Commerce,
Consumer Protection and Competitiveness
Energy and Commerce Committee
Unite State House of Representatives

Dear Congressman Collins:

Attached is my prepared statement on HR 3885, "The Fire Safe Cigarette Act of 1994," which I asked to be made part of the record of the hearing on this bill, scheduled for April 19, 1994. This letter summarizes my concerns.

First, I have some familiarity with the subject. I have spent many years in fire research and test method development. From 1974 until 1981, I was employed by the Center for Fire Research at what is now the National Institute of Standards and Technology, the organization which carried out the research on which this legislation is based. For the last 3 years of my tenure at NIST I was the Director of the Center for Fire Research. In 1987, as a private consultant, I reviewed the first phase of the technical work on reduced-ignition propensity cigarettes at the request of the Consumer Product Safety Commission. At that time, I expressed considerable doubts about some of the findings of that work. Four years later, the cigarette industry discovered this fact and asked me to be a technical consultant to them, which I am.

The most troublesome facts, however, are really not in dispute, they just get different degrees of emphasis in the two opposing points of view. The question is: is there enough information available on which to base a reliable standard. Proponents of this bill say yes; I along with the cigarette industry and others, say no.

I say no for the following reasons:

- There is virtually no evidence that the cotton duck fabrics on which cigarettes would be tested are typical of fabrics actually used in significant amounts to cover upholstered furniture. Indeed, what evidence there is suggests that they are not typical at all.
- This fact is important on two levels. First, it robs us of any reasonable assurance that such a standard would do any good. Testing of a few dozen real world fabrics by the cigarette industry doesn't show any real difference among

the cigarettes. Second, such a small fraction of real fabrics has been tested that there remains a substantial chance that cigarette passing the test would actually cause more ignitions rather than fewer. This isn't a difficult thing to determine, it just takes enough time and money to learn what to expect in the real world. I believe it needs to be done before a standard is adopted.

- My second concern is that, even if the test method doesn't do any more harm than cigarette fires are now doing, it focuses on protecting the part of the population at risk. This is because the test is done under totally stagnant conditions. If the test were done under conditions of imposed airflow, different cigarettes would probably perform well, than the ones which look good now.

- This is also important, because most multiple-death fires, the ones which are most likely to kill children or anyone else besides the careless smoker nearly always happen when there are no closed doors between where the fire starts and the other victims. Open doors means that unimpeded, and often substantial, airflow is available. If it works at all, the test method is going to give rise to a set of cigarettes which were selected based on how they performed under stagnant conditions. Under conditions of airflow, a different set of cigarettes may do better. If I had to choose whether to run the test under stagnant conditions or imposed airflow, I'd pick the airflow. Right now, we aren't sure we need to make such a choice, but I think we should find out if it's important.

I have said all this more formally and at greater length in my statement. Thank you.

Very truly yours,

F. B. Clarke

Frederic B. Clarke, Ph.D.

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the cigarettes. Second, such a small fraction of real fabrics has been tested that there remains a substantial chance that cigarette passing the test would actually cause more ignitions rather than fewer. This isn't a difficult thing to determine, it just takes enough time and money to learn what to expect in the real world. I believe it needs to be done before a standard is adopted.

- My second concern is that, even if the test method doesn't do any more harm than cigarette fires are now doing, it focuses on protecting the part of the population at risk. This is because the test is done under totally stagnant conditions. If the test were done under conditions of imposed airflow, different cigarettes would probably perform well, than the ones which look good now.

- This is also important, because most multiple-death fires, the ones which are most likely to kill children or anyone else besides the careless smoker nearly always happen when there are no closed doors between where the fire starts and the other victims. Open doors means that unimpeded, and often substantial, airflow is available. If it works at all, the test method is going to give rise to a set of cigarettes which were selected based on how they performed under stagnant conditions. Under conditions of airflow, a different set of cigarettes may do better. If I had to choose whether to run the test under stagnant conditions or imposed airflow, I'd pick the airflow. Right now, we aren't sure we need to make such a choice, but I think we should find out if it's important.

I have said all this more formally and at greater length in my statement. Thank you.

Very truly yours,

F.B. Clarke

Frederic B. Clarke, Ph.D.

# STATEMENT OF FREDERIC B. CLARKE, Ph.D.
Before the Subcommittee on Commerce,
Consumer Protection and Competitiveness of the
Energy and Commerce Committee

United States House of Representatives

April 19, 1994

I appreciate this opportunity to testify about H.R. 3885, "The Fire Safe Cigarette Act of 1994".

I am president of Benjamin/Clarke Associates, Inc., a consulting firm that specializes in the analysis of fire safety problems. My clients have included numerous manufacturers and fire service organizations for which I serve as a technical consultant in assessing potential fire hazards, designing fire test methods, and evaluating the reliability and effectiveness of fire safety test methods.

I have been involved in this field for many years. I earned my Ph.D. at Harvard University in 1971, in the field of Physical-organic Chemistry, and was employed at the National Bureau of Standards, Center for Fire Research, from 1974 until 1981. For the last 3 years of my employment at the Center for Fire Research, I served as its Director. My professional activities have included serving as Science Advisor to the United States Fire Administration; chairing the Committee on Research and Development of Committee E05 of the American Society of Testing and Materials; and serving as a Member of the Committee on Fire Toxicology, National Academy of Sciences. My publications include "Fire Hazard Assessment" and "Fire Hazards of Materials, An Overview" in Fire Protection Handbook, National Fire Protection Association (1991); Fire Deaths: Causes and Strategy for Control, Clarke and Benjamin, Technomic Publishing Co., 1985; and Fire and Smoke: Understanding the Hazards, National Academy of Sciences Committee on Fire Toxicology, 1985.

In 1987, at the request of the Consumer Product Safety Commission, I conducted a limited, peer review of "Toward a Fire Safe Cigarette," the Final Report of the Technical Study Group appointed under the Cigarette Fire Safety Act of 1984. Since June, 1991, I have been a technical consultant to the Cigarette Ignition Propensity Joint Venture, a cooperative research and development venture formed by the domestic cigarette manufacturers. My testimony today is based on work that I submitted in April 1993 to the Technical Advisory Group appointed under the Fire Safe Cigarette Act of 1990. A copy of that submission, titled "Review of 1987 Technical Study Group Investigation of Cigarette Ignition Propensity," is attached.

The studies conducted by the National Bureau of Standards (NBS) under the 1984 Act developed ignition propensity "rankings" for a set of experimental cigarettes whose physical characteristics - circumference, density of tobacco, porosity of paper, and presence or absence of paper additives - had been varied to extreme values. In my initial 1987 review of the Final Report of the Technical Study Group, I noted that these NBS rankings were based on limited data. The most important limitation was that the rankings were based on tests involving only three fabrics (placed on selected padding materials) that had not been selected on any apparent systematic basis. I also noted that a relatively small number of tests had been conducted on each fabric and that there had been rather limited statistical analysis of the data. Given the limited data and analysis, I questioned whether the 1987 findings reflected differences in cigarettes or were at least equally the result of the different characteristics of the three test fabrics.

The concern I raised in 1987 reflects certain fundamental principles that apply to the development of a realistic and reliable fire test method – that is, a test method that truly predicts how a given item will behave in the real world and thus prudently can be used to guide product development or serve as the basis for a fire code or regulatory standard. Ignition is a complex physical process, and it can be affected by small changes in the design or composition of a product or in the prevailing environmental conditions. For example, upholstery fabrics come in thousands of varieties and have varying propensities to ignite. Unless the fabric or fabrics on which cigarettes are tested have been carefully selected based upon a determination that they are representative of the spectrum of fabrics and other materials ignitable in the real world, there is a very real risk that the test results will not be predictive of the real world hazard that the test seeks to replicate. Indeed, there is a risk that any ranking of cigarettes based upon an unrepresentative test fabric will show different results than occurs in the real world. Real world results may be a different ranking – even the opposite – of what was found in the laboratory.

During 1992 and 1993, at the request of the Cigarette Ignition Propensity Joint Venture, I conducted an in-depth review of the earlier studies. A detailed statistical analysis also was conducted by Sara S. Debanne, Ph.D., Associate Professor, Department of Epidemiology & Biostatistics, School of Medicine, Case Western Reserve University. Our review confirmed that the rankings reported by NBS in 1987 were dependent on the test fabrics, and that there were significant inconsistencies in the various results. These inconsistencies included so-called "reversals," that is, instances in which an experimental cigarette that appeared to showed reduced ignition propensity actually showed increased ignition propensity on a different test fabric.

We also found other unexplained inconsistencies in the results, some portion of which appeared to be due to fluctuations in environmental conditions such as air flow. As everyone knows, the presence of a breeze – even a slight one – can play a critical role in whether a fire starts or spreads. The 1987 report of the NBS acknowledged that varying airflows in its laboratory had affected its test results. Indeed, the NBS reported instances in which experimental cigarettes ranked thought to be low ignition candidates in still air were found to be just the opposite when the door to the laboratory was left open. (1987 NBS Report, p. 74).

In view of these observations, the development of a reliable and predictive test method obviously requires careful and systematic study to ensure that the test fabrics and paddings are representative of the behavior of the wide array of furniture and mattresses that are at risk in real-world settings. It seems equally apparent that the test should be conducted under appropriate environmental conditions that replicate the circumstances, or range of circumstances, in which real-world fires may occur. Of course, all laboratory-based ignition tests involve some degree of artificiality, and no one contends that such tests must replicate every conceivable setting in which a fire might occur. But some attempt to represent the materials and conditions of the real world is essential, especially when the preliminary research provides strong indications that the choice of fabrics and test conditions can produce widely varying or even contradictory results.

The test methods developed under the Fire Safe Cigarette Act of 1990 by the NIST Building and Fire Research Laboratory, which H.R. 3885 envisions as the basis for a cigarette fire safety standard, cannot be said at this stage to be predictive of how cigarettes will behave in real-world settings. Indeed, there is a sizable risk that the tests may prove to have no real world effect or even to be counter-productive.

This is because, during its work under the 1990 Act, NIST did not conduct an investigation of the behavior of cigarettes on commercial fabrics in actual use, nor did it conduct any systematic investigation of the effects of air flow or other environmental variables. Instead, the proposed tests were developed based on two critical assumptions: first, that the cotton duck fabric selected by NIST for the primary test method is representative of real world soft furnishings because it produced results that are more or less consistent with the 1985-1987 cigarette rankings; and, second, that air flow may safely be excluded from the test method, at least until such time as further evidence clarifies its effect.

These assumptions are the cornerstones underlying the potential benefits – or detriments – of a regulation based on the NIST tests. NIST has acknowledged that both of these are unverified. NIST also has acknowledged that its proposed test methods will require substantial modification, if not abandonment, if either assumption proves to be incorrect. With respect to the selection of cotton duck fabric, NIST acknowledges:

> "At present there are insufficient data available to estimate what fraction of real-world furniture might contain fabrics differing substantially (i.e., beyond the reproducibility of the test method) from cotton ducks in their ignition behavior. If further data become available indicating that such fabrics are a significant fraction of the real-world population, it would be an option to supplement the results of cigarette testing using this method with results based on other carefully-chosen fabrics. (1993 NIST Report, pp. 101-102).

And in responding to the concern that the exclusion of air flow from the NIST tests may invalidate test results, NIST has acknowledged that the test may require major revisions "[s]hould more information on the response of cigarettes to real-world conditions in the future." (Id. at 33).

There is substantial evidence that each of these critical assumptions underlying the NIST test methods are not correct and thus that a standard based on the NIST test methods at best may be unpredictive and at worst would point in the wrong direction. With respect to fabric selection, it should be noted that "cotton duck" is a heavyweight, non-porous canvas-like material that is used in tents, sandbags, tote bags and similar applications. Cotton duck is not used in mattresses, and its use in furniture appears to be limited to director's chair slings. The physical characteristics of cotton duck might not be critical if its ignition behavior were representative of commonly used upholstery or mattress fabrics, but studies of actual commercial fabrics indicate that cotton duck is not an acceptable surrogate. NIST itself has acknowledged, for example, that the ignition behavior of cotton duck is the "opposite" of other fabrics, with heavyweight cotton duck fabrics being less likely to ignite than lighter weight cotton ducks. (Id. at 18). In addition, the NIST Reports shows that inconsistent results were produced by testing cotton duck fabrics in the "crevice" configuration – that is, when a cigarette is placed at the junction of two cushions, thus replicating the common scenario in which a dropped cigarette comes to rest in a furniture crevice, (Id. at 28).

Studies conducted by the Cigarette Ignition Propensity Joint Venture also report that, on the lighter, more porous fabrics commonly used on upholstered furniture, the experimental cigarette designs predicted by the NIST test to have reduced ignition propensity may actually be highly likely to ignite fabrics in common usage. A physical explanation for this anomaly appears to be that cotton duck has a high "heat sink" effect that causes many cigarette designs to extinguish themselves. This effect is much less pronounced in lighter, more porous upholstered fabrics.

A concrete illustration of the extent to which the NIST test method may generate misleading results is provided by tests of commercial cigarettes. NIST's 1993 Report states that five of six unconventional commercial cigarette brands have been found to show significantly reduced ignition propensity compared to other commercial cigarettes. (Id. at 107-108). Indeed, those cigarettes are characterized in H.R. 3885 as "cigarettes with a low ignition propensity [that] are already on the market." Yet, when tested on actual commercial upholstery fabrics, these same cigarettes have been reported to be as likely to ignite commercial upholstery fabrics as cigarettes characterized by NIST as "of very high ignition propensity." (Ibid.).

As noted earlier, air flow has been excluded from the NIST test, subject to further studies of the response of cigarettes to "real-world conditions". Studies conducted by the University of Virginia Department of Aerospace and Mechanical Engineering already have shown, however, that airflows can be expected to be present in most, if not all, real-world settings. Moreover, ignition tests conducted by the Cigarette Ignition Propensity Joint Venture and by Battelle Laboratories have shown that even modest air flows within the range confirmed by the University of Virginia study to be present in most real-world settings produce "reversals" of results from those predicted by the NIST test.

In its August 1993 Report to Congress, the Consumer Product Safety Commission noted that it is "unclear that a standard [based on the research to date] will effectively address the number of cigarette-ignited fires." (CPSC Report, p. v). The CPSC also appropriately noted that "[t]he ignition process is a subtle one, and it is readily affected by air movement" (Id. at 4), that "additional tests of the kind carried out by industry [on commercial fabrics and including air movement] would be necessary to make the cost/benefit findings that might be required to promulgate a standard" (Id. at 24), and that the benefits of a standard based on the research to date are "unknown." (Id. at 21).

These findings do not appear to have been taken into account in H.R. 3885, which assumes that "the necessary technical work for a cigarette fire safety standard" has been completed. (H.R. 3885, Section 1(b)(4)). The importance of the technical work that remains to be done is illustrated by the air movement issue.

Cigarette-related fires that are most likely to result in fatalities to family members such as children involve the spread of heat and smoke beyond the room of origin. Open doors or other conditions creating relatively high air movement are almost certainly involved in these scenarios. The regulatory standard envisioned by the NIST tests thus excludes the conditions that should be given priority and raises a risk that cigarettes will be approved whose ignition propensity is either not reduced or may even be elevated in these circumstances. In addition, verification that the performance of cigarettes on cotton duck is predictive of their behavior on commercial upholstery and/or mattress fabrics is equally critical.

The studies that have been done over the last decade have confirmed that the development of a reliable and predictive cigarette ignition propensity test is far more complex than initially appeared to be the case. The technical work that remains to be done goes beyond defining what margin of safety a regulatory standard might provide. Rather, it involves the more critical question of whether and how a standard has been or can be designed that will have any positive effect. At present, there is even a risk that a standard will inadvertently result in an increased hazard.

# Review of 1987 Technical Study Group
# Investigation of Cigarette Ignition Propensity

## I. INTRODUCTION

### A. Background

In May of 1987, the author was one of those requested by the Consumer Product Safety Commission (CPSC) to conduct a limited peer-review of the Final Report of the Technical Study Group (TSG) prepared under the Cigarette Fire Safety Act of 1984 (1). Reviewers were not asked to evaluate the underlying data upon which the Final Report was based, which were contained in six other project documents, but rather to focus on whether the conclusions of the Final Report were substantiated by the data and the reasoning presented therein.

The comments provided as the result of that review (attached as Appendix A) raised several issues concerning whether the conclusions of the Final Report were fully supported. In particular, it was not clear to this reviewer that the differences in the reported test results for the experimental cigarettes were truly a function of cigarette characteristics alone, but rather that the results might be influenced as well by the choice of substrates on which the cigarettes were tested. The Final Report did not address this question. The comments provided CPSC therefore questioned whether the differences among the cigarettes were any more pronounced than the differences among the substrates and whether the test results, and the rankings of the experimental cigarettes based on those results, could be explained by the differences in the substrates rather than the differences in the cigarettes. A related concern was that the findings in the Final Report were presented without the qualifications and caveats necessary to keep the reader from thinking them firmer and more comprehensive than they actually were.

Additionally, concerns were expressed with respect to the following issues:

- The criteria for interpreting significant and systematic differences among the ignition propensities of current cigarettes.

- The need for more statistical analysis of the experimental data.

- More information on the health effects of the experimental cigarettes.

- The utility of a user-friendly (or even a user-hostile) model to predict the ignition propensity of cigarettes as a research tool.

- The lack of documentation for statements that reduced-ignition-propensity cigarettes would be easy to make.

- The assumptions on which the calculations of economic impact were based.

Although there were some changes in the Final Report as the result of the peer reviewers' comments, for the most part it remained unchanged. In particular, the concerns expressed as to the contributions of cigarette and substrate to overall ignition performance remained unaddressed.

## B. Scope

At the request of the Cigarette Ignition Propensity Joint Venture, the author has conducted an examination of the underlying data on which the conclusions of the Final Report were based. The examination was conducted to address the following questions:

First, to what extent do the underlying data provide support for the conclusions expressed in the Final Report with respect to the rankings of the experimental cigarettes and the reproducibility and reliability of those rankings as indicators of real-world ignition propensity? Stated another way, do the data provided by the TSG tests provide a sufficient basis for those results to be used as a standard by which future potential test methods may be evaluated? This is important because that is how the TSG data are being used: the current research conducted under the Fire Safe Cigarette Act of 1990 is judged on the basis of whether the results reproduce the TSG findings. As discussed below, one conclusion of this analysis is that the underlying data, as reported in "The Effect of Cigarette Characteristics on the Ignition of Soft Furnishings," contain potentially significant omissions. A test method that is developed and evaluated principally on the basis of whether it reproduces the results of the limited testing program conducted in the earlier research will reproduce the limitations of that research as well, and take no account of any useful information developed in the intervening period. The result in the case is a real risk that a test method developed on such a basis may rank cigarettes in a manner that is contrary to real-world ignition behavior.

Second, what are the important variables - - either identified specifically in the TSG reports or known otherwise - - which control whether a test method is reproducible, reliable and realistic? The primary reference documents for this exercise are the 1987 TSG reports (2), particularly the National Institute of Standards and Technology (NIST) report on "The Effect of Cigarette Characteristics on the Ignition of Soft Furnishings" (3), referred to herein as TSG report number 3. The NIST report identifies a number of key variables for which a systematic investigation appears to be critical to the development of a reproducible, reliable and predictive test method. Among these variables are: the representativeness of the fabric and padding; control of smolder-promoting impurities which are common in commercial upholstery fabrics; and investigation of the effect of air flow on test results.

At an early stage in the review of the NIST report, it became apparent that a more detailed statistical analysis of the 1987 test results was necessary. Dr. Sara Debanne, Associate Professor of Epidemiology and Biostatistics of the School of Medicine, Case Western Reserve University has carried out such an analysis, using several different techniques. Those of Prof. Debanne's conclusions which bear most strongly on this report are:

1. That both cigarette design variables and substrate characteristics affect ignition propensity;

2. That the experimental plan allows the cigarette design variables to be inspected one by one, but it does not allow the same individual sorting of the effects of the substrate characteristics;

3. That the substrates tested do not yield consistent rankings of cigarettes, and hence that adding up a cigarette's total number of ignitions across the various substrates is an inappropriate measure of its ignition propensity;

4. That a detailed examination of the effects of substrate, padding and configuration is warranted, as well as tight control of environmental conditions.

The text which follows begins with a general review of several pertinent principles of test method development. There follows a review of the first issue identified above and examined as well by Prof. Debanne - - the extent to which the conclusions of the Final Report were substantiated by the underlying data, particularly as they bear on distinguishing cigarette performance and substrate behavior. Finally, the report reviews the data pertaining to representativeness of test substrates, test conditions and other variables that were identified as potentially determinative of the outcome of test method development in the 1987 TSG work or have been so identified in subsequent studies. The report concludes with recommendations on the steps necessary to ensure that a test method provides reproducible, reliable and predictive results.

## II. DEVELOPMENT OF A TEST METHOD FOR CIGARETTE IGNITION PROPENSITY

### A. Primary and Secondary Test Methods

As used in engineering practice, a test method is a prescribed procedure which, when followed, produces a test result, usually in the form of measurements. The term "standard" (used as an adjective, not a noun), means generally recognized as excellent or authoritative, so that someone following a standard test method can reasonably expect it to be a valid way of making the determination. One also should be justified in assuming that the measurements made are the right ones to do the job that is intended. Finally, because the variables surrounding the measurement are closely controlled, the standard test method performed on identical subjects but in another place, or by someone else equally competent, should give essentially the same results.

We are concerned here with phenomenological testing, i.e., a test result which is a physical event, in this case ignition. Criteria for passing and failing are built into the test: ignition either occurs or it does not. This is the *primary* test procedure, a simulation of the ignition event as it occurs in the real world. The simplest approach is to prescribe the procedure for lighting the test cigarette, placing it on a substrate (i.e., a small mock-up of a furniture cushion consisting of the combination of fabric and padding which simulates the furniture item to be ignited) in a environment representative of what might be encountered in a real situation, and determining whether ignition occurs. In such a test, the substrate represents the universe of actual furniture items on which the tested cigarette might be accidentally deposited. This approach only works, however, if the order of performance among cigarettes, at least the experimental ones developed for the TSG study, does not depend critically on what substrate is chosen. Otherwise the test results say nothing about the ignition propensity of a cigarette on real furniture unless it happens to be made of the same fabric and padding as the test substrate.

Making the connection between a mock-up and full-scale is obviously crucial, since the purpose of the test is to model real cigarette ignition events. This means not only that the cigarettes which do not ignite the mock-up must also fail to ignite actual furniture of the same materials, but also that the cigarettes which do not ignite the mock-up also do not ignite actual furniture made of less readily-ignitable materials.

For the primary test method to accomplish its purpose in actual practice, the order of ignitability of the substrates on actual furniture must be shown to parallel the order on the mock-up.

The same considerations apply when selecting the environmental conditions for the test method. It is possible to envision real-life circumstances where a cigarette dropped on a chair or sofa encounters anything from stagnant air to a stiff breeze; it may lie on a flat surface or be nearly smothered in a crevice. Clearly, determining what conditions are most typical is a difficult and laborious procedure. A common alternative is to select a set of reasonable, but nevertheless essentially arbitrary, conditions and to simulate those in the test. This short cut is valid only if other sets of environmental conditions, equally foreseeable and reasonable, do not produce results at odds with those obtained under the conditions chosen. If there are such conditions, one must investigate the phenomenon causing the conflicting results as a first step in selecting what have now become non-arbitrary test conditions. This usually means going back and doing the job the short cut was intended to avoid in the first place: identifying "typical" conditions from some sort of epidemiological study of real fires.

Instead of simulating the actual situation that gives rise to the primary method, a *secondary* test method measures something else: a surrogate variable, usually under conditions which are easier to control than those of the primary test. If the secondary measurement is relatable to the behavior which the primary method seeks to address, then the results of the secondary method can be used to substitute for those of the primary test. In fire protection, for example, laboratory measurements of heat release rate on small samples of material can, using appropriate computational techniques, often substitute for expensive and complex full-scale fire tests to determine the intensity of fire buildup and time to flashover in a compartment. Generally, a certain amount of accuracy is sacrificed when the secondary method is used, but gains in speed, cost or simplicity may be adequate compensation. In areas such as fire protection, the difficulties of realistic testing create a strong demand for secondary methods, some of which have only the most tenuous relation to fire hazard. One well-known example is the so-called oxygen-index test, ASTM D2863 (4).

It is obvious, that a secondary method lacks any real utility unless its relationship to the primary test objective is established. A secondary test concept was not developed in the TSG work but several, each concentrating only on the cigarette, were explored. As was stated in the NIST report (Ref. 3, p. 231), "The physics of the ignition process is a function both of the cigarette and the substrate. Therefore, an accurate ignition propensity measurement must involve the two components." One of the principal concerns raised in this report is that the second component, the substrate, has not received the attention needed to be sure that the relative performance of the cigarettes can be separated from that of different substrates. In the vocabulary of this section, it is our view that the results for the experimental cigarettes obtained by the TSG on furniture mock-ups do not constitute an adequate body of information on which to define the primary method, and therefore the development of a secondary one, irrespective of the associated experimental difficulties it may overcome, will be compromised until this deficiency is corrected. These deficiencies are enumerated in the examination of the primary test results as reported by NIST in 1987.

## B. Establishing an Order of Cigarette Performance in a Primary Test

Two measures of the quality of a test method are the degree to which it successfully simulates the real-life situation it tests for and how well it controls the experimental conditions which may affect the results. There is no real formula to assess the degree of simulation, and one must rely on experience and common sense. In the case of a test for cigarette ignition propensity, for example, one might be initially inclined to construct a conveniently-sized physical model of what is known to be an actual ignition scenario, where the substrate, relevant geometry and environmental conditions thought to be associated with a real incident are reproduced. Of course, one does not know how useful the test will be for predicting performance in any other scenario unless the range of real scenarios and the influence of their particulars on the ignition process have been explored. Given the complexity of ignition phenomena and the many factors which influence it, this is likely to be a substantial undertaking.

The first question to be examined is whether the TSG work really established that there is in fact an order of cigarette ignition performance which is independent of substrate. The statistical analysis, carried out by Prof. Debanne, in a companion paper to this one, addresses this question rigorously. This paper takes a more qualitative approach to the same issue, one which looks at the logical consequences of having an order of cigarette performance.

The TSG's first step was to obtain 32 different experimental cigarette prototypes, one with each of the 32 combinations of properties arising from independently varying five ignition-influencing parameters at two levels. The second step was to test each cigarette on three different substrates - California test fabric over cotton batting (CA/CB), "Splendor" fabric over polyurethane foam (SP/PU)* and denim over polyurethane foam (Denim/PU). Although the paddings are commonly used, there is no evidence that the three fabrics were chosen as the result of any knowledge of industry practice or current usage patterns. Rather they were chosen because they show differences among the test cigarettes (Ref. 3, p. 62). It was immediately apparent from the 1987 work, therefore, that this essentially arbitrary selection of fabrics was provisionally acceptable only if the order of cigarette performance was consistent over all three substrates.

Most of the results from the 1987 mock-up tests using three fabrics (TSG Report #3), on cigarette ignition studies, are reproduced here as Table 1. The basis of these data

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* The TSG data also included a second set of tests on this substrate where the 32 cigarettes were tested with half their tobacco column removed. Since a new variable was introduced by this set of tests, it is not included here as a trial of the original experimental cigarettes.

TABLE 1
Ignition Propensity of Series 1 Experimental Cigarettes

| Cigarette No. Design | CA/CB unc./flat | SPL/PU unc./flat | Denim/PU crev./cov. |
|---|---|---|---|
| 101 BNLC-21 | F (Fail) | F | P (Pass) |
| 102 BNLN-21 | P | F | P |
| 103 BNHC-21 | F | F | P |
| 104 BNHN-21 | F | F | F |
| 105 BELC-21 | P | F | P |
| 106 BELN-21 | P | P | P |
| 107 BEHC-21 | F | F | P |
| 108 BEHN-21 | F | F | P |
| 109 FNLC-21 | F | F | P |
| 110 FNLN-21 | F | F | P |
| 111 FNHC-21 | F | F | F |
| 112 FNHN-21 | F | F | F |
| 113 FELC-21 | P | F | P |
| 114 FELN-21 | P | F | P |
| 115 FEHC-21 | F | F | P |
| 116 FEHN-21 | F | F | P |
| 117 BNLC-25 | F | F | F |
| 118 BNLN-25 | F | F | F |
| 119 BNHC-25 | F | F | F |
| 120 BNHN-25 | F | F | F |
| 121 BELC-25 | F | F | P |
| 122 BELN-25 | F | P | P |
| 123 BEHC-25 | F | F | P |
| 124 BEHN-25 | F | F | P |
| 125 FNLC-25 | F | F | F |
| 126 FNLN-25 | F | F | P |
| 127 FNHC-25 | F | F | F |
| 128 FNHN-25 | F | F | F |
| 129 FELC-25 | F | F | P |
| 130 FELN-25 | F | P | P |
| 131 FEHC-25 | F | F | P |
| 132 FEHN-25 | F | F | P |

CA/CB = California test fabric/cotton batting
SPL/PU = 100% cotton Splendor fabric/polyurethane 2045
Denim/PU = 100% cotton Denim fabric/polyurethane 2045
Unc/flat = Uncovered cigarette on a flat mock-up
Crev/cov = Covered cigarette in mock-up crevice

B = burley
F = flue cured
N (2nd letter) = normal packing
E = expanded tobacco
L = low porosity paper
H = high porosity paper
C = citrate present
N (4th letter) = no citrate
21 = 21 mm circumference
25 = 25 mm circumference

is a series of tests in which ignition of a specific substrate by a given cigarette type was attempted five times. The TSG originally reported the number of times ignition occurred. Reflecting Prof. Debanne's caution against combining the number of ignitions, the results of testing each cigarette-substrate combination in Table 1 is simply designated as "pass" (P) if 0, 1 or 2 ignitions occurred, and as "fail" (F) if 3, 4 or 5 ignitions occurred.

Hypothesizing that the order of performance of the cigarettes is independent of substrate is equivalent to saying that the substrates themselves have a unique order of ignitability, which is governed solely by the properties of each substrate and unaffected by which cigarette is being tested. This hypothesis is tested on the data of Table 1. If the substrates do in fact have a unique order of ignitability, which will be the same no matter which cigarette is tested then, as testing proceeds, that order would be discerned and, eventually, one could arrange the substrates in order of increasing ignitability. As each cigarette was tested, it would divide the substrates into two groups - those on which the cigarette passed and those on which it failed. If each cigarette were tested on three different substrates, it would fall into one of four classes.

| Class | Substrate 1 Hardest to Ignite | Substrate 2 Intermediate | Substrate 3 Easiest to Ignite |
|---|---|---|---|
| 1 | pass | pass | pass |
| 2 | pass | pass | fail |
| 3 | pass | fail | fail |
| 4 | fail | fail | fail |

There is no class where, for example, a cigarette would fail on Substrate 1 and pass on Substrate 2 and 3, because this would be a different order of substrate ignitability and violate the hypothesis that the order is the same for all the cigarettes. In general, a single order of ignitability among n substrates allows the existence of no more than n + 1 classes.

Grouping the data of Table 1 according to which substrates are ignited produces the five classes shown in Table 2. This is one more than is allowed under the hypothesis of a single substrate order. If the order of cigarette performance were independent of substrate, there would be a Class 2 or a Class 2a, but not both. Since Class 2a is half as big as Class 2, it cannot be ignored, and some resolution of the anomaly is required.

A similar situation occurred when three of the experimental cigarettes, all thought to be of relatively low ignition propensity, were tested against Haitian Cotton on cotton batting, a substrate identified in the TSG report as an "approximately worst case" fabric. If there is really such a thing as a worst-case substrate then, if a cigarette were ever going to ignite *any* substrate, this should be the one. In fact, however, two of the three cigarettes, #114 and #130, *passed on Haitian Cotton yet failed on another, supposedly less ignitable, substrate* (SP/PU and CA/CB, respectively). The only conclusion one can offer is that there is not, in fact, a single worst-case for all cigarettes, and hence the order of substrate ignitability is *not* independent of the cigarette properties.

## TABLE 2

### Groupings of Cigarettes Based on Performance on 3 Substrates

**Class 1** - Passes on all 3 fabrics

106 BELN-21

**Class 2** - Passes on Denim/PU and CA/CB; fails on SPL/PU

102 BNLN-21
105 BELC-21
113 FELC-21
114 FELN-21

**Class 2a** - Passes on Denim/PU and SPL/PU; fails on CA/CB

122 BELN-25
130 FELN-25

**Class 3** - Passes on Denim/PU; fails on SPL/PU and CA/CB

101 BNLC-21
103 BNHC-21
107 BEHC-21
108 BEHN-21
109 FNLC-21
110 FNLN-21
115 FEHC-21
116 FEHN-21
121 BELC-25
123 BEHC-25
124 BEHN-25
126 FNLN-25
129 FELC-25
132 FEHN-25

**Class 4** - Fails on all 3 fabrics

104 BNHN-21
111 FNHC-21
112 FNHN-21
117 BNLC-25
118 BNLN-25
119 BNHC-25
120 BNHN-25
125 FNLC-25
127 FNHC-25
128 FNHN-25

## C. Establishing an Order of Substrate Performance

Unlike cigarettes, which can be manufactured to relatively close tolerances and with a comparatively high degree of uniformity, upholstered furniture is highly variable in its shape and in the burning characteristics of its padding and fabric covering. This variability is a primary concern in the development of a test method; the substrate selected to act as a surrogate for the furniture must display not only the appropriate degree of ignitability, but also must exhibit sufficient uniformity that the same degree of ignitability is maintained day to day from laboratory to laboratory.

By far the most systematic published survey of the ignitability of cotton fabrics was carried out by Ihrig, Rhyne, Norman and Spears at Lorillard Research (5). Thirty-three different cotton upholstery fabrics were evaluated against four different test cigarettes thought to range in ignition propensity from "conventional" to "low". The substrates were exposed to the cigarettes in three different test configurations, as a flat surface, in a tight crevice and in a loose one. A schematic illustration of the results of the cigarette ignition of these fabrics over polyurethane foam is shown in Table 3. Among the key findings:

- When tested over polyurethane, only 10-20% of the fabrics showed any difference in response to the four cigarettes in any one configuration. The rest of the fabrics virtually always ignited or virtually never ignited.

TABLE 3

Cigarette Ignitions of Cellulosic Fabrics
on Polyurethane Substrate. Data of Ihrig, et al ( 5 )

Configuration and Cigarette Designation

| Fabric No. | Flat | | | | Tight Crevice | | | | Open Crevice | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1590 | 1592 | 1596 | 1601 | 1590 | 1592 | 1596 | 1601 | 1590 | 1592 | 1596 | 1601 |
| 1 | □ | □ | □ | □ | □ | □ | □ | □ | □ | □ | □ | □ |
| 2 | □ | □ | □ | □ | □ | □ | □ | □ | □ | □ | □ | □ |
| 3 | □ | □ | □ | □ | □ | □ | □ | □ | □ | □ | □ | □ |
| 4 | □ | □ | □ | □ | □ | □ | □ | □ | □ | □ | □ | □ |
| 5 | □ | □ | □ | □ | □ | □ | □ | □ | □ | □ | □ | □ |
| 6 | □ | □ | □ | □ | □ | □ | □ | □ | □ | □ | □ | □ |
| 7 | □ | □ | □ | □ | □ | □ | □ | □ | □ | □ | □ | □ |
| 8 | □ | □ | □ | □ | □ | □ | □ | □ | □ | □ | □ | □ |
| 9 | □ | □ | □ | □ | □ | □ | □ | □ | □ | □ | □ | □ |
| 10 | □ | □ | □ | □ | □ | □ | □ | □ | □ | □ | □ | □ |
| 11 | □ | □ | □ | □ | □ | □ | □ | □ | □ | □ | □ | □ |
| 12 | □ | □ | □ | □ | □ | □ | □ | □ | □ | □ | □ | □ |
| 15 | □ | □ | □ | □ | □ | □ | □ | □ | □ | □ | □ | □ |
| 17 | □ | □ | □ | □ | □ | □ | □ | □ | □ | □ | □ | □ |
| 13 | □ | □ | □ | □ | □ | □ | □ | □ | □ | □ | □ | □ |
| 19 | □ | □ | □ | □ | □ | □ | □ | □ | □ | □ | □ | □ |
| 20 | □ | □ | □ | □ | □ | □ | □ | □ | □ | □ | □ | □ |
| 16 | □ | □ | □ | □ | □ | □ | □ | □ | ■ | □ | □ | □ |
| 18 | □ | □ | □ | □ | ■ | □ | □ | □ | ■ | □ | □ | □ |
| 14 | □ | □ | □ | □ | ■ | □ | □ | □ | ■ | □ | □ | ■ |
| 21 | □ | □ | □ | □ | ■ | ■ | □ | □ | ■ | □ | □ | □ |
| 23 | ■ | □ | ■ | □ | ■ | □ | ■ | □ | ■ | □ | ■ | □ |
| 22 | □ | □ | □ | □ | ■ | □ | □ | □ | ■ | ■ | ■ | ■ |
| 25 | ■ | □ | □ | □ | ■ | ■ | ■ | □ | ■ | □ | ■ | ■ |
| 24 | ■ | □ | □ | □ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| 27 | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| 28 | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| 26 | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| 29 | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| 30 | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| 31 | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| 32 | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| 33 | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |

□ ignition by test cigarette < 50% of the time

■ ignition by test cigarette > 50% of the time

- The fabrics which showed a difference in response to the four cigarettes were not the same ones in each test configuration, although there was some overlap.

- The cigarettes did not show the same order of performance on all fabrics which showed a difference.

If the fabrics all ranked the four cigarettes in the same order, one would observe in Table 3 the same downward "stair-step" pattern from right to left for each of the three configurations tested. In fact, there is little discernible difference in the behavior of the other three cigarettes across the three configurations, although there are slight differences within a given configuration.

Although Ihrig, et al did not know, and hence could not select its test fabrics to mirror the profile of cotton upholstery fabrics in place on the nation's furniture, neither were there any known biases which would skew the set away from the national profile. Hence, there is no reason not to suppose that the results reported in this study would be roughly indicative of actual national experience if cigarettes like those tested were suddenly universally introduced. (They also suggest considerably lower estimates of the effect of a reduced ignition propensity cigarette than those predicted in the TSG study (6) on this subject.)

The factor to which fabric ignitability was most sensitive was the smolder proclivity of the fabric, which in turn is closely related to the amount of alkali metal ion, sodium or potassium, present in the fabric. In fact, other investigators, have shown (7) that the smoldering behavior of cotton fabrics can often be completely changed by varying this parameter. When tested over polyurethane, cotton fabrics which contain no sodium or potassium rarely can be ignited by cigarettes, but increasing the levels to a few tenths of a percent (a few thousand ppm) will practically guarantee ignition in many of these cases. The 1987 NIST report therefore appropriately noted that quantification of the effect of these ions is pivotal in developing a reproducible primary test method (Ref. 3, pp. 4, 10).

## III. CONTROL OF EXPERIMENTAL CONDITIONS

The second measure of test method quality is how well the test conditions (regardless of their relevance to real life) are controlled. This attribute is commonly described by the test method's precision, or reproducibility, and is most easily appreciated if the test result is a number. If everything which can influence the measured property or phenomenon is held constant, then every time the same test is run on an identical subject, the same numerical result will be obtained. In practice, of course, this rarely happens and replicates of what is thought to be the same test can produce results which vary over a range of values. The smaller the range the higher the precision of the test method.

Virtually all test methods produce results with some variability, but in the case of pass-fail tests, the variability will be masked when the dividing line between passing and failing lies outside the range of variability. When the pass-fail line falls within the range of variability, however, the results from identical subjects will sometimes be a pass and other times a failure. If a range of subjects is tested repeatedly with a given method, one expects the results to fall into three groups: the best performing subjects, which pass the test virtually every time; the worst performing subjects, which always fail and an intermediate group which pass sometimes and fail others. A pass/fail test method with high precision is one which produces a low number of subjects in the middle group. Rigid control of all the variables which influence the outcome means that the conditions are absolutely identical and a given test subject will pass every time - or fail every time. In the real world, however, there will usually be a family of subjects which are on the borderline - passing sometimes and failing others.

### A. Airflow

Among the conditions expected to affect the outcome of a cigarette ignition experiment is the magnitude and direction of the airflow in the vicinity. The type of dependence, however, is not intuitively obvious, since ventilation produces several opposing effects. For example, increasing airflow in the direction of smoldering would enhance the air supply to the smoldering region, thereby increasing its heat output, but it would also carry more heat away. Even in the absence of more detailed information, one has reason to expect relatively modest airflows to have an important effect on cigarette ignition, as can be appreciated from the following considerations. A conventional cigarette smoldering at 15 watts requires the arrival of 10-20 ml/s of air at the smoldering zone to sustain combustion. If the total surface of the smoldering zone accessible to the incoming air is one square centimeter, then airflows in the immediate vicinity of the coal of 10-20 cm/s are to be expected. The effect is a linear one: a cigarette, designed to burn at a lower rate such as many of those in the test program would induce a correspondingly lower flow rate, perhaps 5-10 cm/s. Normal indoor ventilation typically produces airflows of 5-10 cm/s in the vicinity of open doorways. It is reasonable to suggest therefore, that even readily-encountered environmentally-generated derived airflows may, depending on the orientation, be enough to halve or double the expected burn rate of some cigarettes, and, correspondingly, the cigarette's propensity to ignite.

This ventilation issue has been discussed in the TAG meetings subsequent to publication of the TSG reports. It has been suggested that airflow conditions used in a test need not be established as the most typical or realistic so long as they are ones which show a difference between cigarettes. This line of reasoning, which seems to be followed in the NIST report (Ref. 3, p. 89), is based on the assumption that airflow affects all cigarette designs in a similar manner, and therefore does not change the order of cigarette performance. If there are airflow conditions under which the original order of cigarette performance is reversed, then without knowing more about real-world conditions, there is no assurance of any positive benefit from the tests.

What appears on the basis of one set of test results to be a positive step may actually lead to a net increase in cigarette ignitions, not a decrease, because the conditions under which the reversal occurs may be more common in reality than the test conditions.

There is experimental evidence for reversals. In attempts to confirm the results of the TSG, Adiga, and co-workers (8) observed the expected ignition order at zero flow - - the conventional cigarette failed and the low-propensity passed - - when evaluated on denim fabric containing 450 ppm of potassium ion on polyurethane foam. At an imposed airflow of 5 cm/s, however, exactly the reverse situation was observed. Such a finding suggests that the ventilation issue may not be as straightforward as was assumed earlier and that important unanticipated effects may occur at airflows typical of residential settings. It should be taken as a warning signal that an important interaction may have been overlooked, and systematic study of that interaction is needed before the test method moves beyond the laboratory.

The concern is heightened by the airflow measurement studies conducted by Flace, et al. This study represents the first effort to measure the presence and extent of airflows in full-scale tests simulating real-world settings. The reported results, finding airflows produced merely by simulated body heat at 4 mm. from the surface of the furniture and within of the range at which Adiga et al and others find "reversals" of predicted cigarette rankings, appear to confirm that airflow is present in most, if not all, real world fire scenarios. This is consistent with NIST's 1987 observation of airflow effects in a full-scale crevice test.

Even if the effects of ventilation are relatively monotonic, they may still be important, simply because cigarette-caused fires resulting in multiple deaths are far more likely to involve the spread of heat and smoke beyond the room of origin, and thus almost certainly occur when the door of that room is open. One would expect multiple-death fires to have first priority for protection, so that any test method put in place should take careful account of the ventilation conditions associated with such spreading fires, i.e., open doors and relatively high ventilation.

## B. Alkali Metal Content of Test Fabrics

Because of the important effect the level of alkali metal ions can have on ignitability, it is a critical parameter to control closely on the test fabric. Control must extend down to a scale of a few millimeters, and one can easily see why such close control must be the case. Since the cigarette coal is only in contact with perhaps 0.5 square centimeters of fabric on the mock-up at any time, it is the sodium or potassium level in this small area which will determine whether ignition will occur. As the cigarette burns down, it would fail to ignite the substrate if it encountered only points where the alkali metal ion concentration is very low, but if it encounters just one area of relatively high concentration, then ignition can occur. If the cigarette under test is prone to self extinguishment or is shorter to begin with, then it will not burn as far and the opportunity for it to encounter an area of high metal ion concentration is correspondingly reduced. This may explain why, when the TSG tested cigarettes with half of the tobacco column removed, and which therefore burned half as far, substantially fewer ignitions were observed. It may also more generally explain why so many tests show such spotty and inconsistent results - - igniting sometimes and not others. Unfortunately, no experimental light is shed upon this as a source of error by the analyses for alkali metals performed on the test materials, because the analyses were carried out in larger samples - 2 inches or so on a side.

One might expect that such inconsistencies would be of particular concern in fabrics where the concentration of alkali metal ions is manipulated in the laboratory. Any mottling or local wet spots may signal the migration of the aqueous solution in which the ions are introduced, a phenomenon controlled by the surface tension of the aqueous ionic medium and the capillarity of the treated fabric. Fabric studies of the distribution of alkali metal ions over fabric areas comparable to that of a cigarette coal appear warranted.

## IV. TEST RESULTS VS. THE OCCURRENCE OF ACTUAL CIGARETTE IGNITION INCIDENTS

The first rule which must be obeyed in order for a test method to have anything beyond serendipitous real-world impact is that the test must predict whether the ignition would occur at full-scale, assuming no intervention, on an item of actual furniture made of the materials as the test mock-up. This alone, however, is insufficient, given the thousands of fabrics and several padding materials which appear on upholstered furniture today. The test substrates chosen should be fairly representative not only of what is in common usage, but also of what can reasonably be expected to be affected by a cigarette which passes the test. No single substrate seems likely to span the whole range of these possibilities (although a weighting system for scoring composite cigarette performance on several combinations of configuration and substrate is certainly feasible). At the very least, however, one must know where the chosen substrates fit within the spectrum of ignitability.

Table 3, from Ihrig, et al (5) is a good illustration of the data needed. Based on this, if one chose to test in a flat configuration alone, the chances are two out of three that one would use fabric 24 or 25 as a substrate. But Table 3 also shows that ignitions involving these two fabrics in other configurations still occur; the only fabric showing a difference in all three configurations would actually be fabric 23. This is especially significant in the absence of any information on the relative probabilities that cigarettes will be dropped in the three configurations shown. If the open crevice is actually the predominant scene of cigarette ignition, then the penalty for selecting any fabric except #23 would be a good deal worse.

There is no information in the TSG work comparable to Table 3, but in which the fabrics surveyed are selected on the basis of their frequency of occurrence. In our view, such data are needed before the effects of what may appear to be a reduced-ignition-propensity cigarette can be forecast.

The NIST report did compare ignition predicted by a mock-up to that for a full-scale furniture item of the same materials. The results, as re-analyzed by Debanne, showed a significant effect due to scale. In the trials where agreement between test and full-scale was not observed, the test prediction usually went the wrong way, i.e., the bench-scale test predicted no ignition but full-scale ignition actually did occur. So, in the cases where the test fails to predict full-scale performance, the failing is in the direction of increased hazard.

## V. DISCUSSION, CONCLUSIONS AND RECOMMENDATIONS

There has been a large leap in proceeding from the TSG research program, which looked at characteristics of experimental cigarette design, to the development of a test method as the basis for a performance standard. For example, one encounters statements like that from the conclusions (Ref. 3, p. 231), that the variability of fabrics is too great for a mock-up method based on real-world materials to be used as a standard test. The implication of that statement is that the only barrier to having a test method well in hand was the lack of assurance that testing materials could be obtained with adequate uniformity to guarantee that test results would be comparable over a period of time. In fact, it is a warning signal that the relationship between substrate and cigarette may drive the observed test results. Indeed, this is specifically stated elsewhere in the report (c.f. Ref. 3, p. 135). The writer could not keep from wondering in his 1987 review of the TSG Final Report how, if the interactions between substrate and cigarette are so complex and hard to define, and if there are so many characteristics of the latter which can vary enough to effect the results, it is then possible to be confident that the order of ignition of cigarettes reported by the TSG is in fact the "right" order.

Did anyone say it was? In effect the TSG findings may take on such characteristics if they are allowed to be the last word on the subject. Work under the 1990 Act has not focused on the root question of the relationship between cigarettes and substrate, but concentrated instead on locating substrates which produce results consistent with these limited experiments. Left unaddressed were the remaining questions identified in the TSG reports. Without answers to these questions, some of the features which a suitable test method must simulate remain unclear. The most serious shortcoming is that it has yet to be established that the ignition propensity measured by one substrate will hold true in general. In fact, there is considerable evidence to the contrary. Since the intent of the 1990 Act is to develop a test for ignition propensity probative of behavior when cigarettes are dropped on *any* substrate, this is crucial.

One's worries on this score are heightened by reviewing the other aspects of the problem.

- The influence of airflow on the ignition test. Since recent evidence has emerged that small changes in airflow can reverse the order of performance of test cigarettes, it is important that the dimensions and implications of this effect, both for the test method and for the real life ignition scenarios it attempts to model, be explored and understood.

- The control of alkali metal ions on the ignitability of the fabric/padding substrate, not just at the level of the fabric lot or bolt, but at a level of resolution comparable to the dimension of the cigarette coal, i.e., a few millimeters. Since only five repetitions constituted a test result in the NIST work, it is entirely possible that the number of runs was insufficient to average out the effects of local inhomogeneities in alkali metal ion content, and the TSG results are thus questionable on those grounds.

The most consequential result of the TSG work is the four groupings of cigarettes produced by their being tested on three substrates. Since the announced purpose of the TSG work was to elucidate the effects of selected design variables on cigarette ignition propensity, it is important to revisit what was obtained: 30 cigarettes grouped into four groups (ignoring the two anomalous ones, discussed in Section II). Unless fine, probably unwarranted, distinctions are made between a cigarette which produced ignition one or two more times (out of five) than another, the exercise can tell us nothing more about their performance than the group to which they belong. The conclusions one can draw are thus quite limited. One has no way of knowing, for example, if a slightly lower or higher alkali metal content in one of the fabrics or cotton batting might have moved a few cigarettes into another group, or if carrying out the tests at an airflow rate of 5 cm/s might have produced a different grouping entirely. This tentativeness is, of course, is to be expected in any exploratory experiment intended to gather information on a broad front, but it may be inappropriate to accord retrospectively to such results a degree of absoluteness which has not been tested and confirmed.

It is equally important to resolve the performance of the various experimental cigarettes more sharply before a secondary test concept is agreed upon. As pointed out in the NIST report, the only really authoritative information on cigarette ignition propensity can come from examining the behavior of substrates (p. 231). Once this information has been gained, *then* a secondary method is appropriate to provide simpler test procedure. One can foresee the temptation, however, to use data from a so-called secondary method to rank cigarettes without establishing whether that the ranking is also borne out by actual ignition testing on mock-ups that span the range of real-world variables found to affect results. Until this connection is made, the information provided by the second method, however precise and reproducible, bears only a speculative connection to reducing actual ignitions. Consider, for example, the 14 cigarettes in Group 3 of Table 3. The 1987 NIST study shows them all to perform equivalently. Suppose that a measurement method is devised, such as counting the number of sheets of cellulose filter paper that cause a cigarette to go out, which ranks the 14 cigarettes in some order. The inference, that the ranking holds true for ignition propensity on real substrate mock-ups as well is, however, just that: an inference. There is no justification to segregate members within each of the four groups on the basis of the secondary test ranking.

In the meantime, there are important additional measure which, in our view, must be taken to improve confidence in the findings of the TSG and to expand the information they provide.

1. The role of airflow on cigarette ignition must be explored. If reversals in the order of cigarette performance as a function of airflow are confirmed and significant, its influence on the TSG results must be determined. Some means must be devised to identify the most appropriate set (or sets) of airflow conditions for a test method as well.

2. The alkali metal ion content and distribution in of the substrates used in the TSG work should be rechecked at a finer level of resolution and similar precautions applied to all test fabrics and padding in the future.

3. Additional substrates should be identified on which the experimental cigarettes should be tested. At present, little can be gleaned as to the relative merits of the various design variations employed. These substrates should also be chosen on the basis of their representativeness of those in actual use.

If one were to accept at face value the notion that development of an acceptable test method uses the present TSG findings as a destination rather than as guideposts to improvement, then the test method will necessarily reproduce performance based on the three substrates used by the TSG. Although this is fine for research, it is unsatisfactory as a basis for a cigarette performance standard test because there is no evidence that the fabrics used were chosen on the basis of any real-world experience, and there is good reason to believe that the identity of the substrates is directly-linked to crucial rankings of the cigarettes.

The undertakings of the TSG work and the 1990 Act are ambitious and the motivation is commendable. Indeed, the importance of the work makes the concerns expressed in this report all the more pressing.

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*APPENDIX A*

# Review of
# "Toward a Fire Safe Cigarette",
# First Draft of the Final Report
# of the Technical Study Group on Cigarette
# and Little Cigar Fire Safety,
# Cigarette Safety Act of 1984

This is a review of the final report of the Technical Study Group, and does not reflect a detailed reading or review of the referenced component background reports. I have skimmed the component reports, but most readers will not do so, and so I assert that sufficient information must be contained in the final report to allow people to evaluate at least the logic and validity of the conclusions which it contains. I have also marked up the draft report in some detail, and have not treated matters of style and clarity beyond what is annotated in the text.

This review is divided into an overall commentary and then reviews each major section, the introduction, technical feasibility, commercial feasibility, economic impact, conclusions, and recommendations in a more detail.

## Overall Comments

By and large, the report is well-written and relatively easy to understand. It is organized in a straightforward fashion; some of the component sections lack clarity or sufficient detail, but the components flow well toward fulfilling the objectives at hand. There are some exceptions to this, and they will be noted in the following sections.

## Executive Summary

The first paragraph of the executive summary lays out quite neatly the purpose of the whole exercise. It appears that the conclusions are taken verbatim from the conclusions which appear near the end of the final report. To the extent that those conclusions and recommendations will require modification, the executive summary should reflect this as well. Incidentally, none of the recommendations for further work are included in the executive summary. This is suspicious; if the recommendations lack sufficient force to make it to the executive summary, then are they really worth making?

## Introduction

The introduction is generally well done. Some minor editorial and suggestions for clarity are noted in the text. Oddly, the real purpose of the Cigarette Safety Act of 1984 is not spelled out; it is only implied. The report says that the

Act established a Technical Study Group, and then the Technical Study Group was directed to do a series of things. This is followed by a long, and not very interesting, history of the technical study group and its funding. The unschooled reader would, I think, assume that the purpose of the Act was to develop information as to the feasibility of reducing cigarette ignition propensity, yet the text suggest that the medium (i.e. the Technical Study Group), is at least as important as the message (the information).

Technical Feasibility

The conclusions associated with commercial cigarettes appear to be in conflict: only three out of 18 of the substrates were found to show statistically significant differences among the cigarettes; no one packing consistently showed low ignition propensity in all three substrates, and the differences among current commercial cigarettes are supposedly small. It is stated that there are statistically significant differences among the cigarettes, but these differences are not systematic. How then do we know that the differences among commercial cigarettes are real at all?

Several readings of this section have not convinced me that we are certain that it is the cigarettes, and not the substrates which vary. The notion that the burning of substrates are sufficiently reproducible to identify differences in cigarettes is key to this entire concept. Also, on page 19, in the section on commercial feasibility, it is stated that the variability in fabrics and paddings is far less a factor in determining the resistance of furniture items to ignition by a standard cigarette than the other way around. It is not obvious why this is true, but the demonstrated truth of this proposition is crucial to the entire notion of screening. Therefore, this discussion needs to be done much better.

By and large, the report does a very good job of presenting what must be a huge amount of experimental data in easy to understand form. Whoever wrote the final report did a very good job in this respect. Words like "statistically significant" appear occasionally in the text but I find no statistical analysis appearing in the final report. Since parametric studies were carried out, the statistics of the conclusions are very important and one would indeed expect a correlation coefficient, or something like that, to be developed. I am not suggesting that standard errors and correlation coefficients clutter up the report, but some more care should be devoted to nailing down statistical certainty.

The introduction states that analysis of the nicotine, tar and carbon monoxide contents of the parametric cigarettes was carried out, but no data are reported. In view of the often-heard argument that tampering with existing cigarettes would likely raise the amounts of harmful components in smoke, it seems to me that findings to the contrary, which this report claims to have made, should be discussed in a little more detail. The statement in the conclusions, that some of the experimental cigarettes have smoke analyses comparable to commercial ones, really does not accomplish this. Are some of the others are much worse? If that is the case, it should be stated, even though it is not clear why there should be any correlation between nicotine, tars, and other cigarette construction parameters.

The testing of patented cigarettes seems almost pointless. It verifies that some of the patented suggestions for cigarettes really do reduce the ignitions; why else would they be patented? What would be far more useful is to identify the features of the patented cigarettes which reduce the ignitions, whether or not these features are subsumed in the parametrized program of testing just done, or whether some totally unanticipated phenomenon is involved. Since each patent contains also a patent disclosure, which discusses the novel elements invention, it seems to me that a good deal more can be gained from a survey of the five patented cigarettes than was done.

It is not at all clear why it is necessary to have a user-friendly model to catalyze the production of low ignition cigarettes. How would the model be used to screen possible combinations of characteristics? Does the model consider characteristics besides the half dozen or so which are dealt with in the parameters? If so, they constitute additional information which does not appear in this report. If not, then the model should simply be exercised, even if it is slow and unfriendly, to identify what combinations of the five parameters give cigarettes with the lowest ignition propensity. The only real utility of having a friendly model is if each computational situation is so unique, and the number of variables so large, that the thrust or trend of the data cannot be discerned. This does not seem to be the case here. If the model provides a prediction based on multi-variant analysis, whereas the data from the parameters only show the effect of one variable on a ignition propensity, it should be stated. However, the reader is left with a distinct suspicion that an elaborate model is of academic rather than of commercial interest.

## Commercial Feasibility

The only worry one has with section is that the report does almost nothing more than assert that there would be minimum difficulty in manufacturing cigarettes embodying these improvements. No data are presented; no experts are quoted; and certainly the solidity of the statements made here do not compare in documentation to those made in the previous section.

## Economic Impact and Other Consequences

The reader has difficulty understanding the workings of the benefit-cost model. In particular, the five modifications used in the model are listed, and it is implied that one is able to tell how much the ignition propensity is reduced by using these five modifications. However, in the section on fire losses it is presumed that the manufacturer produces a cigarette yielding no ignitions. Is the reader to infer that using these five modifications actually results in such a cigarette? If so, it could much more clearly stated. On the assumption that this is the case, i.e., that an ignition-proof cigarette is the basis of the case study, what are we to make of the claim on page 21 that the NFPA has developed a formalism for linking test performance to fire loss reduction? One assumes that the formalism developed by NFPA is mentioned, but not used, in the cost benefit study.

Is the "per puff" yield of nasties an important distinction? It sounds like weasel-wording, as though the analysis on something other than a per puff basis would give a different answer.

In reading the result of the model on page 22, one is confused to discover that a 50% effectiveness in eliminating ignitions is assumed. This harkens back to the earlier question of what estimates and diagnostics for efficacy of the product are being used in the model.

The results of the model itself raise two questions. First, why are only avoided property losses from fire, and not the cost of health care and lost human potential, included? The assertion that the health effects are a function of changes in pricing of the cigarettes seems irrelevant. I fail to understand what a brief excursion into tax policy has to do with the cost and benefits of a proposed safety measure. Finally, a little more description of the conditions used in the sensitivity analysis should be included. They're simply too cryptic. For example, the term "ignition reduction" implies a big change in fire losses but none in the economics or health aspects. Clearly, ignition reduction cannot mean the reduction in cigarette ignitions, since it is inconceivable that a reduction in fire losses would not also have positive economic and health consequences. Therefore, more explanation is needed.

## Conclusions

Many of the conclusions have already been discussed implicitly in the foregoing sections. I have numbered the conclusions in my copy of the draft. Conclusion 3, concerning the tar and nicotine yields of the new cigarettes, smacks of selective interpretation of the data. This can be solved by a little more discussion of smoke analysis in the body of the report. Conclusion 5, that performance variation can only be tested in the research laboratory, gets back to the concern raised earlier. Are we really sure we're measuring cigarette performance and not fabric performance? Conclusion 6 says there is no standard measurement to determine whether a cigarette is ignition prone, implying that such a measurement method exists but is simply not standardized. Why is making it a standardized test so tough if the test concepts are sufficiently valid that we are willing to base the conclusions of this report on them?

## Recommendations for Further Work

As I mentioned at the outset, the failure to carry any of these recommendations into the executive summary makes one suspicious of their importance. Certainly, the first four recommendations are important matters of policy if reduced ignition cigarettes are to be pursued at all. The last two recommendations are arguable; they are at best of pedagogical rather than policy-related interest. Perhaps the recommendations should be separated on that basis.

ONE HUNDRED THIRD CONGRESS

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U.S. House of Representatives
Committee on Energy and Commerce

SUBCOMMITTEE ON COMMERCE,
CONSUMER PROTECTION, AND COMPETITIVENESS

Washington, DC 20515-6120

April 28, 1994

The Honorable Ann Brown
Chairman
Consumer Product Safety Commission
Washington, DC 20207

Dear Chairman Brown:

Thank you for testifying at the Subcommittee's recent hearing on H.R. 3885, the Fire Safe Cigarette Act of 1994. Following is a question for the record of the hearing. Please respond and return to the Subcommittee within five business days.

In your testimony, you indicated that in June 1993, a representative of one of the cigarette companies asked a member of the CPSC staff how the Commission would react if the company were to unilaterally make certain changes in its product to reduce ignition propensity. You also testified that a company had contacted you in recent days and requested an opportunity to talk with the Commission about voluntary options on the fire-safe cigarette issue.

In the subsequent testimony of Congressman Whitley of the Tobacco Institute, he indicated that Dr. David Townsend of R.J. Reynolds Tobacco Company was the individual who had made the contact regarding a unilateral action by one company. Congressman Whitley indicated that it might be appropriate for Dr. Townsend to describe the contact, but Dr. Townsend did not do so at the hearing. Please provide for the record a complete description of Dr. Townsend's contacts with the Commission referred to in your testimony.

Thank you for your cooperation.

Sincerely,

Cardiss Collins
CARDISS COLLINS
Chairwoman

CC:rh

[illegible]
[illegible]

May 9, 1994

The Honorable Cardiss Collins
Chairwoman
Subcommittee on Commerce, Consumer Protection
and Competitiveness
Committee on Energy and Commerce
U.S. House of Representatives
151 Ford House Office Building
Washington, DC 20515

Dear Madam Chairwoman:

Chairman Brown has asked me to respond to your letter of April 28, concerning Commission contacts with Dr. David Townsend of R.J. Reynolds Tobacco Company.

In preparing Chairman Brown's testimony for your Subcommittee last month, I learned that on June 24, 1993, following a meeting involving the Commission's work under the Fire Safe Cigarette Act of 1990, Dr. Townsend asked Ms. Bea Harwood, the CPSC project manager, what the Commissions response would be if R.J.R. were to cease production of non-filter cigarettes and would switch to lower porosity paper in all its cigarettes. Mr. Roy Deppa, a CPSC engineer, assigned to the fire safe cigarette project, and who was also present during the conversation, reported that Townsend said he was directed to ask the question by top executives of the company.

During a discussion of this incident with Ms. Harwood in early April, she encouraged me to call Dr. Townsend and discuss the company's offer with him. I did so and he renewed the offer to discuss the actions which the Commission could take, including changes in the cigarette, to reduce cigarette ignited fires. I told him I would call him after the hearing to pursue the matter further.

Sincerely,

Robert J. Wager

Robert J. Wager
Director Congressional Relations

UNITED STATES
CONSUMER PRODUCT SAFETY COMMISSION
WASHINGTON, D.C. 20207

May 10, 1994

The Chairman

The Honorable Cardiss Collins
Chairwoman
Subcommittee on Commerce, Consumer Protection
and Competitiveness
Committee on Energy and Commerce
U.S. House of Representatives
151 Ford House Office Building
Washington, DC 20515

Dear Madam Chairwoman:

In Volume I of the Consumer Product Safety Commission report to the Congress on the Practicability of Developing a Performance Standard to Reduce Cigarette Ignition Propensity, August 1993, the statement was made that, "While the Commission concludes that it is practicable to develop a performance standard to reduce cigarette ignition propensity, it is unclear that such a standard will effectively address the number of cigarette-ignited fires." (Executive Summary p. vii). In preparing for the recent testimony before your Subcommittee, I reviewed all the evidence available on this subject, and join in the conclusion previously expressed by Commissioner Jones-Smith on this matter. We believe a performance standard based on the National Institute of Standards and Technology (NIST) test method is practicable and can reduce cigarette ignition propensity.

Accordingly, we reaffirm our support for H.R. 3885.

Sincerely,

Ann Brown

Jacqueline Jones-Smith
Commissioner

Ann Brown
Chairman

cc: The Honorable Joseph Moakley
Charles O. Whitley, Tobacco Institute
Dr. David Townsend, R.J. Reynolds Co.
Dr. Richard G. Gann, NIST
Dr. Donald R. Shopland, NCI

UNITED STATES
CONSUMER PRODUCT SAFETY COMMISSION
WASHINGTON, D.C. 20207

The Chairman

August 10, 1993

The Honorable Cardiss Collins
Chairwoman
Subcommittee on Commerce, Consumer Protection
and Competitiveness
Committee on Energy and Commerce
151 Ford House Office Building
U.S. House of Representatives
Washington, DC 20515

Dear Madam Chairwoman:

I am pleased to provide you with a copy of the final report required by the Fire Safe Cigarette Act of 1990 (Public Law 101-352).

Please be advised that the Consumer Product Safety Commission's (CPSC) internal decision-making procedures require a formal vote of approval by a majority of Commission in order to transmit a report to Congress. These CPSC procedures also allow amendment of a report by a majority of the Commission.

Because changes, with which I take exception, were made to this report by the Commission's majority during approval process, I have attached for your review a copy of my statement made for the agency's record at the time of the Commission vote.

Sincerely,

Jacqueline Jones-Smith

UNITED STATES
CONSUMER PRODUCT SAFETY COMMISSION
WASHINGTON, D.C. 20207

The Chairman

**Statement of Chairman Jacqueline Jones-Smith**
**Final Report on the Fire Safe Cigarette Act – August 4, 1993**

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The Fire Safe Cigarette Act of 1990 (FSCA) directs the Consumer Product Safety Commission (CPSC) and the National Institute of Standards and Technology to carry out specific tasks to assess the practicability of developing a performance standard to reduce cigarette ignition propensity. The FSCA also specifically designates the Chairman of the CPSC as the lead policy official for this effort and directs the Chairman to report to Congress on activities undertaken to implement the law.

The Final Report to Congress required under the FSCA, therefore, is meant to be the Chairman's report alone. However, because of CPSC's internal decision-making procedures, a formal vote by the entire Commission is required to approve and transmit a report to Congress. These CPSC procedures also allow amendment of a report by a majority of the Commission.

In fact, during the clearance and voting process on the Final Report to Congress on the Fire Safe Cigarette Act, changes were made to the report by the Commission's majority. Although some of the changes are only editorial improvements, I take strong exception with substantive changes which I believe undermine the objectivity of the report.

The issue of whether it is practicable to develop a performance standard to reduce cigarette ignition propensity is controversial. Successful completion of this effort necessarily involved managing and balancing diverse and often competing public and private interests. This was particularly evident in the Technical Advisory Group (TAG) established by the FSCA. At the outset of this effort, however, I promised and sincerely sought objectivity, to the extent possible, in the management of this undertaking. The TAG was encouraged to air all disagreements and consider all aspects of the issues before it.

The CPSC staff has worked diligently to create what I believe to be a balanced, objective report which addresses the inquiry mandated by the FSCA. The report objectively deals with disputed issues, including issues not in agreement with the majority of the TAG. I commend the staff for its fine effort.

While the Commissioners and I seem to be in agreement that a determination of practicability in no way establishes a performance standard, their changes to the report go too far and advocate the positions of very special interests. Although I believe it appropriate that the Commissioners and I met, individually, with special interest groups to hear their concerns, advocating their positions in the context of this scientific and technical report is inappropriate and undermines its objectivity. Some organizations do have legitimate positions that Members of Congress may wish to hear. Those groups, however, are more than capable of making their positions known and do not need an independent regulatory agency to intercede on their behalf.

ONE HUNDRED THIRD CONGRESS

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SUBCOMMITTEE ON COMMERCE,
CONSUMER PROTECTION AND COMPETITIVENESS

Washington, DC 20515-6120

September 21, 1993

The Honorable Jacqueline Jones-Smith
Chairman
Consumer Product Safety Commission
Washington, DC 20207

Dear Madame Chairman:

Thank you for sending me the final report required under the Fire Safe Cigarette Act of 1990. The comments in your cover letter were helpful.

As you pointed out in the statement accompanying your cover letter, the Act specifically required the final report to be submitted by the Chairman of the CPSC. It was somewhat surprising to see that the other Commissioners made changes in your report before its submission to Congress. Since the law required the report to be submitted by the Chairman, it would be useful to know what your report said, before the changes were made.

Please provide the Subcommittee with a description of the specific changes made by the other Commissioners to your report. The description should include the specific text before the changes were made.

This information will assist the Subcommittee in its evaluation of the report. Thank you for your cooperation.

Sincerely,

Cardiss Collins

CARDISS COLLINS
Chairwoman

CC:rh

PSCA

UNITED STATES GOVERNMENT

MEMORANDUM

U.S. CONSUMER PRODUCT
SAFETY COMMISSION
WASHINGTON, D.C. 20207

**DATE:** October 1, 1993

**TO:** Richard Huberman, Counsel
Subcommittee on Commerce, Consumer Protection, and Competitiveness

**FROM:** Edward D. Harrill
Director Congressional Relations
Ed Harrill

**SUBJECT:** MATERIAL REQUESTED BY CHAIRWOMAN COLLINS

Enclosed, per the September 21 request of Chairwoman Collins, are the ballot votes of the members of our Commission on the language of the Final Report on the Fire Safe Cigarette Study. Changes to the original text are shown in each of the ballots.

Let me know if you need further information.

Enclosure

OS#3180

UNITED STATES GOVERNMENT

MEMORANDUM

RECEIVED

'93 AUG -3 P3:12

U.S. CONSUMER PRODUCT
SAFETY COMMISSION
WASHINGTON, D.C. 20207

DATE: AUG 3 1993

TO : The Commission

Through: Sadye E. Dunn, Secretary
Eric C. Peterson, Executive Director ZCV

FROM : Jerry G. Thorn, General Counsel
Stephen Lemberg, Assistant General Counsel SL
Allen F. Brauninger, Attorney, OGC

SUBJECT: Final report to Congress on implementation of the Fire Safe Cigarette Act of 1990

BALLOT VOTE due AUG 4 1993

The Fire Safe Cigarette Act of 1990 (FSCA) (Pub. L. 101-352, 104 Stat. 405) was enacted on August 10, 1990, and requires the Commission and the National Institute of Standards and Technology to carry out specified tasks for the purpose of making "an assessment of the practicability of developing a performance standard to reduce cigarette ignition propensity." The FSCA also requires the Chairman of the Commission to report to the Congress on activities undertaken to implement that statute. The final report must be submitted not later than August 10, 1993.

A memorandum from the Commission staff transmits a draft of the final report required by the FSCA for approval by the Commission. The draft report discusses completion of the research directed by the FSCA and contains an assessment of the practicability of developing a performance standard to reduce cigarette ignition propensity.

On July 23, 1993, the Cigarette Ignition Propensity Joint Venture (Joint Venture) wrote to the Commissioners to request the inclusion of a report prepared by the Joint Venture in the final report to be submitted to Congress in accordance with the FSCA. A memorandum from the Office of the General Counsel discusses legal issues presented by the request of the Joint Venture.

Please indicate your vote:

I Approve the draft report without change.

CPSA 6 (b)(1) Cleared *8/3/93
✓ No Mfrs/PrvtLblrs or Products Identified
___ Excepted by ________
___ Firms Notified, Comments Processed.
* With OGC Memo Removed
#3180

________________ Signature    ________ Date

NOTE: This document has not been reviewed or accepted by the Commission.
Initial Rh Date 8/3/93

II Approve the draft report with the following changes (please specify):

(see attached)

8/5/93

Signature

Date

III Do not approve the draft report.

Signature

Date

IV Take other action (please specify):

Signature

Date

Chairman Jacqueline Jones-Smith
Recommended Changes to the
Final Report to Congress on implementation of the Fire Safe Cigarette Act of 1990
August 6, 1993
To Accompany OS#3180

---

1. Page v, paragraph three, sentence one, Executive Summary:

   Strike the words "...the groundwork has been established by..."

   Insert the words "broad parameters have been identified through"

2. Page 19, paragraph 3, IV. Technical Advisory Group:

   Move paragraph 3 to the end of page 18.

3. Page 24, paragraph 1, Summary of Practicability

   After the first sentence, insert the following sentence: "However, the Commission notes that in order to more fully address issues raised in this report additional work is needed."

OS#3180

REC'D

UNITED STATES GOVERNMENT

MEMORANDUM

'93 AUG -3

U.S. CONSUMER PRODUCT
SAFETY COMMISSION
WASHINGTON, D.C. 20207

DATE: AUG 3 1993

TO : The Commission

Through: Sadye E. Dunn, Secretary
Eric C. Peterson, Executive Director ZCP

FROM : Jerry G. Thorn, General Counsel
Stephen Lemberg, Assistant General Counsel SR
Allen F. Brauninger, Attorney, OGC

SUBJECT: Final report to Congress on implementation of the Fire Safe Cigarette Act of 1990

BALLOT VOTE due AUG 4 1993

The Fire Safe Cigarette Act of 1990 (FSCA) (Pub. L. 101-352, 104 Stat. 405) was enacted on August 10, 1990, and requires the Commission and the National Institute of Standards and Technology to carry out specified tasks for the purpose of making "an assessment of the practicability of developing a performance standard to reduce cigarette ignition propensity." The FSCA also requires the Chairman of the Commission to report to the Congress on activities undertaken to implement that statute. The final report must be submitted not later than August 10, 1993.

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Please indicate your vote:

I Approve the draft report without change.

CPSA 6 (b)(1) Cleared * 8/3/93
✓ No Mfrs/PrvtLblrs or Products Identified
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* with OGC Memo Redacted
# 3180

____________________
Signature

__________
Date

NOTE: This document has not been reviewed or accepted by the Commission.
Initial Rh Date 8/3/93

Page 1 of 2

Page 2

II Approve the draft report with the following changes (please specify):

(See attached)

Mary Gall 8/5/93

Signature Date

III Do not approve the draft report.

Signature Date

IV Take other action (please specify):

Signature Date

UNITED STATES
CONSUMER PRODUCT SAFETY COMMISSION
WASHINGTON, D.C. 20207

The Chairman

*The Honorable Thomas S. Foley*
*Speaker of the House*
*U.S. House of Representatives*
*Washington, D.C. 20515*

*Dear Mr.* ~~*Foley:*~~ Speaker

*In accordance with the provisions of the Fire Safe Cigarette Act of 1990 (Public Law 101-352), I am transmitting to the Congress the final report describing the research prescribed by the Act. The Commission and the National Institute of* ~~*Science*~~ *and Technology have completed all of their assigned tasks. The findings are described in detail in the report transmitted with this letter.*

*While the Commission concludes that it is practicable to develop a performance standard to reduce cigarette ignition propensity, the effort to achieve such an objective is beyond both the jurisdiction and the technical capability of the agency. It would therefore be prudent for Congress, if it determines that pursuing this objective is in the national interest, to identify and delegate to a more appropriate agency the task of working with industry to develop a performance standard to reduce cigarette ignition propensity.*

*Sincerely,*

*Jacqueline Jones-Smith*

# I. Executive Summary

The Fire Safe Cigarette Act of 1990 directed the U.S. Consumer Product Safety Commission (Commission) and the National Institute of Standards and Technology (NIST) to carry out research designed to provide an assessment of the practicability of developing a performance standard to reduce cigarette ignition propensity, that is, the likelihood that a cigarette will act as an ignition source for mattresses, upholstered furniture, and similar items. This report describes the results of that research.

**Practicability of Developing a Performance Standard**

it is unclear that such a standard will effectively address the number of cigarette-ignited fires.

While the Commission concludes that it is practicable to develop a performance standard to reduce cigarette ignition propensity; the effort to achieve such an objective is beyond both the jurisdiction and the technical capability of the agency. It would, therefore, be prudent for Congress, if it determines that pursuing this objective is in the national interest, to identify and delegate to a more appropriate agency the task of working with industry to develop a performance standard to reduce cigarette ignition propensity.

further

To this end, broad parameters have been identified through ~~the groundwork has been established by the successful completion of~~ the research specified in the Fire Safe Cigarette Act. The actual development of a standard would require the following:

(A) setting appropriate acceptance criteria for the ignition test method;

(B) establishing the appropriate series of tests for toxicity and setting acceptance criteria for each of those tests;

(C) estimating the safety benefits to be derived from the imposition of such tests; and

(D) determining the costs to cigarette manufacturers, consumers, and others of such a standard. The Commission emphasizes the importance of including toxicity tests in a standard, since even a small increase in toxicity could outweigh the beneficial effect of fewer fires.

The Fire Safe Cigarette Act directed the completion of several specific tasks, some of which were to be carried out by NIST, others by the Commission.

### Develop Information on the Societal Cost of Cigarette Fires

The Commission estimates that in 1990 the total direct cost of cigarette-ignited fire deaths, injuries, and property damage was approximately $4.0 billion (in 1992 dollars). The estimated cost of fatal and non-fatal injuries, which comprises a substantial portion of the total, includes estimates for medical and transport costs, productivity loss, pain and suffering, and legal and insurance costs. Fatal injuries, estimated at 1200 in 1990, account for about $2.5 billion of this total; hospitalized non-fatal injuries, chiefly thermal burns and smoke inhalation, account for more than $1.0 billion. Direct property damage from cigarette fires comes to about $500 million annually.

### Develop Information on Toxicity and Health Effects (in consultation with the Secretary of Health and Human Services)

A panel of cigarette smoke toxicity experts developed a plan for testing low ignition-potential cigarettes. The purpose of the tests is to assure that whatever changes are made to achieve ignition resistance do not result in increased toxicity and adverse health effects beyond those that currently exist. Since the comprehensive set of proposed tests would cost about $330,000 per cigarette type, a reduced number of tests estimated at $6,900 per cigarette type was recommended as a practical first step implementation. Five cigarette types, including two prototype ignition-resistant cigarettes, two commercial brands, and a standard reference cigarette, were tested according to this reduced protocol. The results demonstrated that such an approach is practical and that the tests can distinguish differences among cigarette types.

### Technical Advisory Group

The Act named a Technical Advisory Group (TAG) of 15 members representing the cigarette industry, government, the fire services, and health groups to advise the Commission and NIST on their work. The TAG met regularly during the course of this research, offering valuable comments at each stage. Several members of the TAG representing cigarette manufacturers gave or sponsored presentations of research that had been independently pursued, primarily related to the effect of air flow and fabric selection on the ignition propensity of cigarettes. The majority of the TAG supports the findings described above; a minority, almost always members representing cigarette manufacturers, disagrees, questioning primarily the validity of the test methods developed by NIST. They contend that the test methods have not sufficiently been shown to represent the way cigarettes ignite furnishings in real life. Both majority and minority opinions are described in the TAG's final advisory report to the Commission, which appears at Appendix A.

(The National Association of State Fire Marshals, although not represented on the TAG, agrees with this position.)

## Health Effects Assessment Plan

After consideration of the testing proposed by the expert panel, and in consultation with DHHS, the Commission developed the following performance-based plan. Four sequential tiers of testing are proposed:

Tier I: chemical analyses of smoke: acidity and reduction/oxidation potential, carbon monoxide, hydrogen cyanide, and nitrogen oxides, aldehydes, volatile hydrocarbons, volatile nitrosamines, particulate matter (tar), catechols, nicotine, phenols, polynuclear aromatic hydrocarbons, and tobacco-specific nitrosamines.

Tier II: *in vitro* tests: *Salmonella* mutagenicity (Ames' assay) and mouse embryo fibroblast cell transformation assay.

Tier III: indicators of human smoking behavior: levels of cotinine and carbon monoxide in human subjects, smoker topography (puff volume, frequency, and draw velocity).

Tier IV: *in vivo* tests: mouse inflammatory lung response, hamster respiratory tract carcinogenicity, and mouse skin painting carcinogenicity.

Satisfactory performance at one tier would be required before proceeding to the next. The toxicities of the prototypes should be compared with marketed types intended for replacement or comparable marketed types, and standard reference cigarettes. However, the definition of acceptable levels of performance at any tier is beyond the scope of this plan ~~and~~ Moreover, it is beyond the direction given by the Act.

The FTC method is the basis for the mechanical generation of smoke constituents for the tests described in Tier I. However, the test protocol, especially in terms of puff volume, frequency, and draw velocity, may need to be revised based on actual smoking behavior as measured in Tier III. Unless consistent correlation of testing results of mainstream and sidestream smokes can be shown, both must be separately collected and tested.

Additives in the prototypes exceeding the current levels of use or new additives must be disclosed to determine whether additional testing is needed. Improvements in toxicity testing and risk evaluation may occur in the future and should be considered during possible revisions of the plan.

## IV. Technical Advisory Group

The Fire Safe Cigarette Act established a Technical Advisory Group (TAG) to advise and work with the Consumer Product Safety Commission and NIST on the implementation of the Act. The members were, in general, the same individuals who served on the Technical Study Group (TSG) for the Cigarette Safety Act of 1984.

The Technical Advisory Group met regularly and discussed every aspect of the work in progress. Both NIST and Commission staff made regular presentations about the progress of the work. In addition, several members of the TAG representing cigarette manufacturers or their designated representatives presented the results of research independently undertaken. Most of the industry presentations were intended to raise doubts about the validity of the NIST test method. In addition to the questions about air flow and fabric selection, the presentations were intended to contradict some of the statistical conclusions from the earlier report of the Technical Study Group in 1987.

[ Although the Commission concludes that the test method developed by NIST bears a reasonable relationship with real life conditions, it notes that additional tests of the kind carried out by industry ~~might~~ would be necessary to make the cost/benefit findings that might be required to promulgate a standard.

Make change and move to end of p. 18

# V. Practicability of Developing a Performance Standard

The research described above is relevant to the final and most critical of the directives of the Fire Safe Cigarette Act - an assessment of the practicability of developing a performance standard to address cigarette ignition propensity. There are at least five aspects to such an assessment:

1. development of an acceptable test method
2. appropriate acceptance criteria for such a test
3. possible adverse health effects
4. economic feasibility
5. cost/benefit determinations

A discussion of each of these aspects follows.

## 1. Development of an acceptable test method

The first requirement for a performance standard is the development of a valid and reliable test method for measuring cigarette ignition performance. (A valid test is one that measures what it is intended to measure, in this case the likelihood that a cigarette will start a fire under real life conditions. A reliable test is one that produces similar results when repeated by operators at the same or other laboratories, assuming reasonable diligence in following the test protocol.) NIST's test method research was the single most important task specified in the Act.

The Commission shares NIST's and the TAG's conclusion that the research during the present study, together with research undertaken from 1984 to 1987, establishes the validity and reliability of their test methods within reasonable limits.

Members of the TAG who represent cigarette manufacturers, as well as representatives of the ~~[illegible]~~ National Assn. of State Fire Marshall, claim that the test methods developed by NIST are inadequate. Their primary contention is that the test method developed by NIST is not sufficiently related to real life conditions, particularly in terms of the test fabrics and air flow conditions in the test chamber. They have introduced considerable testimony to this effect at TAG meetings and have submitted a large quantity of written materials.

Representatives of cigarette manufacturers have introduced data indicating that under some air flow conditions and with some fabrics, there is a reversal of ignition propensity ranking from the NIST tests; that is, cigarettes that showed few ignitions using the fabrics and air flow conditions specified in the NIST test method showed many ignitions when tested on certain other fabrics or under certain other air flow conditions, while the reverse was true for cigarettes with a demonstrated high ignition potential in the NIST test. In other words, a reversal of the expected rankings was observed.

Some of the data presented by industry (e.g., a report about air flow prepared by the Battelle Memorial Institute and data from testing fabrics commonly used in upholstered furniture) was introduced at too late a date to be thoroughly considered for this report. While NIST is confident that its test method reasonably reflects what happens in the real world, it acknowledges that if data emerge to establish that changes are needed, the test methods could be modified.

Delete bolding

The Commission also notes that it is not necessary for the test method to discriminate adequately among low and high ignition propensity cigarettes on all fabrics and under all air flow conditions. It is only necessary that it do so in the aggregate. Few test methods or remedial strategies are effective under all possible circumstances.

The accurate and reproducible representation of a real-life process involving fire in a controlled laboratory environment is never easy because of the large number of variables involved. It is not possible in one test, or even a limited series of tests, to reproduce all real life conditions under which a cigarette may start a fire. Insofar as possible, a test must narrow the range of variables to allow examination of the performance characteristic of interest.

It is not unusual for standardized tests to employ materials and test conditions that do not exist or rarely exist in real life. The need to simulate real life must be balanced against the need to use standardized materials that will provide reliable results. If the materials and conditions chosen for a test adequately serve as surrogates for the variety of substrates and conditions found in real life, then their use is acceptable. In this case, prior research under the TSG established the ignition performance of experimental cigarettes using several different fabric and cushion combinations. Experimental cigarettes with those same characteristics were used in developing the present test method.

Cigarette manufacturers have implicitly approved the use of surrogates in their research. Repeatedly they have used fabrics treated with different levels of smolder promoters such as sodium or potassium ions as a surrogate for fabrics with varying levels of ignitability. The fabric selected by NIST, an as-received, undyed cotton duck, was chosen because of the stability of its specifications and performance over time. The three weights used represent varying levels of ignitability and provide flexibility in setting acceptance criteria.

however, can be derived from the current societal cost of cigarette fires as described above. It is unlikely that any performance standard will prevent all cigarette fires. The estimated level of effectiveness would depend on factors such as the stringency of the test (where the acceptance criteria are set) and its precision in accurately predicting ignitability on the range of materials found in U.S. homes. Additional tests on the most frequently used home furnishing materials may be necessary to establish the effectiveness of a standard at the acceptance level prescribed for the test method.

### Summary of Practicability

In summary, while the Commission concludes that ~~it~~ is practicable to develop a standard to reduce cigarette ignition propensity. The Commission also concludes that such an effort is beyond both the jurisdiction and the technical capability of the agency. Therefore, the Commission respectfully suggests that should it be determined that pursuing the development of this standard is in the national interest, the Congress should identify and delegate to a more appropriate agency the task of working with industry to develop the desired performance standard.

However, the Commission notes that, in order to more fully address issues raised by other Interests, additional work is ~~necessary~~ needed.

OS#3180

UNITED STATES GOVERNMENT

MEMORANDUM

'93 AUG -3 P3:26

U.S. CONSUMER PRODUCT
SAFETY COMMISSION
WASHINGTON,D.C. 20207

'93 AUG -3 P3:12

DATE: AUG 3 1993

TO : The Commission

Through: Sadye E. Dunn, Secretary
Eric C. Peterson, Executive Director

FROM : Jerry G. Thorn, General Counsel
Stephen Lemberg, Assistant General Counsel
Allen F. Brauninger, Attorney

SUBJECT: Final report to Congress on implementation of the Fire Safe Cigarette Act of 1990

BALLOT VOTE due AUG 4 1993

The Fire Safe Cigarette Act of 1990 (FSCA) (Pub. L. 101-352, 104 Stat. 405) was enacted on August 10, 1990, and requires the Commission and the National Institute of Standards and Technology to carry out specified tasks for the purpose of making "an assessment of the practicability of developing a performance standard to reduce cigarette ignition propensity." The FSCA also requires the Chairman of the Commission to report to the Congress on activities undertaken to implement that statute. The final report must be submitted not later than August 10, 1993.

A memorandum from the Commission staff transmits a draft of the final report required by the FSCA for approval by the Commission. The draft report discusses completion of the research directed by the FSCA and contains an assessment of the practicability of developing a performance standard to reduce cigarette ignition propensity.

On July 23, 1993, the Cigarette Ignition Propensity Joint Venture (Joint Venture) wrote to the Commissioners to request the inclusion of a report prepared by the Joint Venture in the final report to be submitted to Congress in accordance with the FSCA. A memorandum from the Office of the General Counsel discusses legal issues presented by the request of the Joint Venture.

CPSA 6 (b)(1) Cleared * 8/3/93
✓ No Mfrs/PrvtLblrs or Products Identified
___Excepted by___________
___Firms Notified, Comments Processed
* With OGC Memo Rewrited
# 3180

Please indicate your vote:

I Approve the draft report without change.

________________________ ____________
Signature Date

NOTE: This document has not been reviewed or accepted by the Commission.
Initial Rh Date 8/3/93

Page 1 of 2

II Approve the draft report with the following changes (please specify):

See attached.

Carol G. Dawson
Signature

Aug. 5, 1993
Date

III Do not approve the draft report.

Signature

Date

IV Take other action (please specify):

Signature

Date

UNITED STATES
CONSUMER PRODUCT SAFETY COMMISSION
WASHINGTON, D.C. 20207

The Chairman

*The Honorable Thomas S. Foley*
*Speaker of the House*
*U.S. House of Representatives*
*Washington, D.C. 20515*

*Dear Mr. Foley:*

*In accordance with the provisions of the Fire Safe Cigarette Act of 1990 (Public Law 101-352), I am transmitting to the Congress the final report describing the research prescribed by the Act. The Commission and the National Institute of ~~Science~~* Standards *and Technology have completed all of their assigned tasks. The findings are described in detail in the report transmitted with this letter.*

*While the Commission concludes that it is practicable to develop a performance standard to reduce cigarette ignition propensity, the effort to achieve such an objective is beyond both the jurisdiction and the technical capability of the agency. It would therefore be prudent for Congress, if it determines that pursuing this objective is in the national interest, to identify and delegate to a more appropriate agency the task of working with industry to develop a performance standard to reduce cigarette ignition propensity.*

*Sincerely,*

*Jacqueline Jones-Smith*

# I. Executive Summary

The Fire Safe Cigarette Act of 1990 directed the U.S. Consumer Product Safety Commission (Commission) and the National Institute of Standards and Technology (NIST) to carry out research designed to provide an assessment of the practicability of developing a performance standard to reduce cigarette ignition propensity, that is, the likelihood that a cigarette will act as an ignition source for mattresses, upholstered furniture, and similar items. This report describes the results of that research.

## Practicability of Developing a Performance Standard

While the Commission concludes that it is practicable to develop a performance standard to reduce cigarette ignition propensity, it is unclear that such a standard will effectively address the number of cigarette-ignite fires. Further the effort to achieve such an objective is beyond both the jurisdiction and the technical capability of the agency. It would, therefore, be prudent for Congress, if it determines that pursuing this objective is in the national interest, to identify and delegate to a more appropriate agency the task of working with industry to develop a performance standard to reduce cigarette ignition propensity.

To this end, broad parameters have been identified through ~~the groundwork has been established by the successful completion of~~ the research specified in the Fire Safe Cigarette Act. The actual development of a standard would require the following:

(A) setting appropriate acceptance criteria for the ignition test method;

(B) establishing the appropriate series of tests for toxicity and setting acceptance criteria for each of those tests;

(C) estimating the safety benefits to be derived from the imposition of such tests; and

(D) determining the costs to cigarette manufacturers, consumers, and others of such a standard. The Commission emphasizes the importance of including toxicity tests in a standard, since even a small increase in toxicity could outweigh the beneficial effect of fewer fires.

The Fire Safe Cigarette Act directed the completion of several specific tasks, some of which were to be carried out by NIST, others by the Commission.

### Develop Information on the Societal Cost of Cigarette Fires

The Commission estimates that in 1990 the total direct cost of cigarette-ignited fire deaths, injuries, and property damage was approximately $4.0 billion (in 1992 dollars). The estimated cost of fatal and non-fatal injuries, which comprises a substantial portion of the total, includes estimates for medical and transport costs, productivity loss, pain and suffering, and legal and insurance costs. Fatal injuries, estimated at 1200 in 1990, account for about $2.5 billion of this total; hospitalized non-fatal injuries, chiefly thermal burns and smoke inhalation, account for more than $1.0 billion. Direct property damage from cigarette fires comes to about $500 million annually.

### Develop Information on Toxicity and Health Effects (in consultation with the Secretary of Health and Human Services)

A panel of cigarette smoke toxicity experts developed a plan for testing low ignition-potential cigarettes. The purpose of the tests is to assure that whatever changes are made to achieve ignition resistance do not result in increased toxicity and adverse health effects beyond those that currently exist. Since the comprehensive set of proposed tests would cost about $330,000 per cigarette type, a reduced number of tests estimated at $6,900 per cigarette type was recommended as a practical first step implementation. Five cigarette types, including two prototype ignition-resistant cigarettes, two commercial brands, and a standard reference cigarette, were tested according to this reduced protocol. The results demonstrated that such an approach is practical and that the tests can distinguish differences among cigarette types.

### Technical Advisory Group

The Act named a Technical Advisory Group (TAG) of 15 members representing the cigarette industry, government, the fire services, and health groups to advise the Commission and NIST on their work. The TAG met regularly during the course of this research, offering valuable comments at each stage. Several members of the TAG representing cigarette manufacturers gave or sponsored presentations of research that had been independently pursued, primarily related to the effect of air flow and fabric selection on the ignition propensity of cigarettes. The majority of the TAG supports the findings described above; a minority, almost always members representing cigarette manufacturers, disagrees, questioning primarily the validity of the test methods developed by NIST. They contend that the test methods have not sufficiently been shown to represent the way cigarettes ignite furnishings in real life. Both majority and minority opinions are described in the TAG's final advisory report to the Commission, which appears at Appendix A.

(The National Association of State Fire Marshals, although not represented on the TAG, agrees with this position.)

## Health Effects Assessment Plan

After consideration of the testing proposed by the expert panel, and in consultation with DHHS, the Commission developed the following performance-based plan. Four sequential tiers of testing are proposed:

Tier I: chemical analyses of smoke: acidity and reduction/oxidation potential, carbon monoxide, hydrogen cyanide, and nitrogen oxides, aldehydes, volatile hydrocarbons, volatile nitrosamines, particulate matter (tar), catechols, nicotine, phenols, polynuclear aromatic hydrocarbons, and tobacco-specific nitrosamines.

Tier II: *in vitro* tests: *Salmonella* mutagenicity (Ames' assay) and mouse embryo fibroblast cell transformation assay.

Tier III: indicators of human smoking behavior: levels of cotinine and carbon monoxide in human subjects, smoker topography (puff volume, frequency, and draw velocity).

Tier IV: *in vivo* tests: mouse inflammatory lung response, hamster respiratory tract carcinogenicity, and mouse skin painting carcinogenicity.

Satisfactory performance at one tier would be required before proceeding to the next. The toxicities of the prototypes should be compared with marketed types intended for replacement or comparable marketed types, and standard reference cigarettes. However, the definition of acceptable levels of performance at any tier is beyond the scope of this plan ~~and~~ Moreover, it is beyond the direction given by the Act.

The FTC method is the basis for the mechanical generation of smoke constituents for the tests described in Tier I. However, the test protocol, especially in terms of puff volume, frequency, and draw velocity, may need to be revised based on actual smoking behavior as measured in Tier III. Unless consistent correlation of testing results of mainstream and sidestream smokes can be shown, both must be separately collected and tested.

Additives in the prototypes exceeding the current levels of use or new additives must be disclosed to determine whether additional testing is needed. Improvements in toxicity testing and risk evaluation may occur in the future and should be considered during possible revisions of the plan.

## IV. Technical Advisory Group

The Fire Safe Cigarette Act established a Technical Advisory Group (TAG) to advise and work with the Consumer Product Safety Commission and NIST on the implementation of the Act. The members were, in general, the same individuals who served on the Technical Study Group (TSG) for the Cigarette Safety Act of 1984.

The Technical Advisory Group met regularly and discussed every aspect of the work in progress. Both NIST and Commission staff made regular presentations about the progress of the work. In addition, several members of the TAG representing cigarette manufacturers or their designated representatives presented the results of research independently undertaken. Most of the industry presentations were intended to raise doubts about the validity of the NIST test method. In addition to the questions about air flow and fabric selection, the presentations were intended to contradict some of the statistical conclusions from the earlier report of the Technical Study Group in 1987.

Although the Commission concludes that the test method developed by NIST bears a reasonable relationship with real life conditions, it notes that additional tests of the kind carried out by industry ~~might~~ would be necessary to make the cost/benefit findings that might be required to promulgate a standard.

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# V. Practicability of Developing a Performance Standard

The research described above is relevant to the final and most critical of the directives of the Fire Safe Cigarette Act - an assessment of the practicability of developing a performance standard to address cigarette ignition propensity. There are at least five aspects to such an assessment:

1. development of an acceptable test method
2. appropriate acceptance criteria for such a test
3. possible adverse health effects
4. economic feasibility
5. cost/benefit determinations

A discussion of each of these aspects follows.

## 1. Development of an acceptable test method

The first requirement for a performance standard is the development of a valid and reliable test method for measuring cigarette ignition performance. (A valid test is one that measures what it is intended to measure, in this case the likelihood that a cigarette will start a fire under real life conditions. A reliable test is one that produces similar results when repeated by operators at the same or other laboratories, assuming reasonable diligence in following the test protocol.) NIST's test method research was the single most important task specified in the Act.

The Commission shares NIST's and the TAG's conclusion that the research during the present study, together with research undertaken from 1984 to 1987, establishes the validity and reliability of their test methods within reasonable limits.

as well as representatives of the ~~[illegible]~~ National Assn. of State Fire Marshalls

Members of the TAG who represent cigarette manufacturers, claim that the test methods developed by NIST are inadequate. Their primary contention is that the test method developed by NIST is not sufficiently related to real life conditions, particularly in terms of the test fabrics and air flow conditions in the test chamber. They have introduced considerable testimony to this effect at TAG meetings and have submitted a large quantity of written materials.

Representatives of cigarette manufacturers have introduced data indicating that under some air flow conditions and with some fabrics, there is a reversal of ignition propensity ranking from the NIST tests; that is, cigarettes that showed few ignitions using the fabrics and air flow conditions specified in the NIST test method showed many ignitions when tested on certain other fabrics or under certain other air flow conditions, while the reverse was true for cigarettes with a demonstrated high ignition potential in the NIST test. In other words, a reversal of the expected rankings was observed.

Some of the data presented by industry (e.g., a report about air flow prepared by the Battelle Memorial Institute and data from testing fabrics commonly used in upholstered furniture) was introduced at too late a date to be thoroughly considered for this report. While NIST is confident that its test method reasonably reflects what happens in the real world, it acknowledges that if data emerge to establish that changes are needed, the test methods could be modified.

Delete bolding

The Commission also notes that it is not necessary for the test method to discriminate adequately among low and high ignition propensity cigarettes on all fabrics and under all air flow conditions. It is only necessary that it do so in the aggregate. Few test methods or remedial strategies are effective under all possible circumstances.

The accurate and reproducible representation of a real-life process involving fire in a controlled laboratory environment is never easy because of the large number of variables involved. It is not possible in one test, or even a limited series of tests, to reproduce all real life conditions under which a cigarette may start a fire. Insofar as possible, a test must narrow the range of variables to allow examination of the performance characteristic of interest.

It is not unusual for standardized tests to employ materials and test conditions that do not exist or rarely exist in real life. The need to simulate real life must be balanced against the need to use standardized materials that will provide reliable results. If the materials and conditions chosen for a test adequately serve as surrogates for the variety of substrates and conditions found in real life, then their use is acceptable. In this case, prior research under the TSG established the ignition performance of experimental cigarettes using several different fabric and cushion combinations. Experimental cigarettes with those same characteristics were used in developing the present test method.

**Cigarette manufacturers have implicitly approved the use of surrogates in their research. Repeatedly they have used fabrics treated with different levels of smolder promoters such as sodium or potassium ions as a surrogate for fabrics with varying levels of ignitability. The fabric selected by NIST, an as-received, undyed cotton duck, was chosen because of the stability of its specifications and performance over time. The three weights used represent varying levels of ignitability and provide flexibility in setting acceptance criteria.**

however, can be derived from the current societal cost of cigarette fires as described above. It is unlikely that any performance standard will prevent all cigarette fires. The estimated level of effectiveness would depend on factors such as the stringency of the test (where the acceptance criteria are set) and its precision in accurately predicting ignitability on the range of materials found in U.S. homes. Additional tests on the most frequently used home furnishing materials may be necessary to establish the effectiveness of a standard at the acceptance level prescribed for the test method.

**Summary of Practicability**

In summary, while the Commission concludes that ~~it~~ is practicable to develop a standard to reduce cigarette ignition propensity. The Commission also concludes that such an effort is beyond both the jurisdiction and the technical capability of the agency. Therefore, the Commission respectfully suggests that should it be determined that pursuing the development of this standard is in the national interest, the Congress should identify and delegate to a more appropriate agency the task of working with industry to develop the desired performance standard.

¶

However, the Commission notes that, in order to more fully address issues raised by [this report] other interests, additional work is ~~necessary~~ needed.

BROWN & WILLIAMSON
TOBACCO CORPORATION

B&W

# STATEMENT ON STATUS OF PRODUCT DEVELOPMENT WORK ON CIGARETTE FIRE SAFETY

H.R. 3885. The Fire Safe Cigarette Act of 1994

U.S. House of Representatives
April 19, 1994

Brown & Williamson's work to develop a cigarette with reduced ignition potential has explored concepts offered by other parties, as well as internally generated approaches. We have continually studied logical proposals, including such earlier publicly acclaimed "solutions" as a cigarette that self-extinguishes within five minutes and Charles Cohn's invention that applied a mineral solution to cigarette paper. Both proved unreliable in avoiding fires. HEW tested the Cohn invention, which essentially lowered the porosity of cigarette paper, and found it undesirable because of substantially increased smoke constituent deliveries.

Brown & Williamson continues to develop and analyze experimental cigarettes internally and conducts ongoing exploratory work to learn even more about the phenomenon of cigarette fire ignition. We participated in several rounds of laboratory experiments intended primarily to develop a valid method to test cigarette ignition propensity. The research also provided us with information about the ignition behavior of various cigarettes incorporating design features that NIST has said were related to lowered ignition propensity. Our laboratory participated in cigarette ignition screening of furniture fabrics and performed research on the effects of air flow on ignition propensity. The research demonstrated that air movement typical in real world conditions can produce ignition results which are the reverse of predictions based on NIST information. Brown & Williamson has internally designed and created test cigarettes incorporating our experience and the design features involved in the research, including lower porosity paper, high proportion of expanded tobacco, and reduced circumference, with our own technology and ideas.

Our development work has not yet produced a cigarette that would not ignite fires in real consumer environments. In addition, many of the experimental cigarettes have had characteristics which would make them unacceptable to consumers, such as substantially increased deliveries of carbon monoxide, "tar," and nicotine to the smoker.

A cigarette acceptable to consumers that can be said to have reduced ignition potential is beyond the grasp of Brown & Williamson product development at this time. Our product work continues to agree with our ignition research data, indicating that environment variables such as the furniture fabric, air flow, and substrate, rather than the cigarette design, determine whether ignition will occur. To describe a cigarette as having reduced ignition potential, it would first be necessary to perform a test which reliably predicted that, in the real world, it would ignite fewer fires than other cigarettes. In our opinion, such a test is not available. The analytical methodologies proposed by NIST do not predict whether ignition would occur in environments where lit cigarettes are likely to be dropped. NIST stated recently that one of Brown & Williamson's cigarette brands has a lower ignition propensity than other brands. We would be pleased if the statement were correct. However, research will be presented to this Committee by another company which demonstrates that when cigarettes are tested on commercial furniture fabrics, the brand identified performs no better than others.

ONE HUNDRED THIRD CONGRESS

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U.S. House of Representatives
Committee on Energy and Commerce

SUBCOMMITTEE ON COMMERCE,
CONSUMER PROTECTION, AND COMPETITIVENESS

Washington, DC 20515–6120

April 28, 1994

Dr. Richard Gann
Chief, Fire Science Division
National Institute of Standards and Technology
Gaithersburg, MD 20899

Dear Dr. Gann:

Thank you for testifying at the Subcommittee's recent hearing on H.R. 3885, the Fire Safe Cigarette Act of 1994. Following is a question for the record of the hearing. Please respond and return to the Subcommittee within five business days.

The cigarette industry has raised two specific criticisms of the NIST test method, which you addressed in your prepared statement. First, the industry has argued that the test method is not necessarily valid on fabrics other than cotton duck and, with some fabrics, the results may be the reverse of what is expected. Second, the industry argues that NIST ignored the effects of airflow. In addition, Dr. Townsend of R.J. Reynolds Tobacco Company raised other criticisms of the test method, including a discussion of Hungarian cigarettes. See the enclosed letter from R.J. Reynolds Tobacco Company for a further discussion of industry objections to the test method. Please provide, for the record of the hearing, a response to the objections raised by Dr. Townsend and the industry at the hearing and in the enclosed letter.

Thank you for your cooperation.

Sincerely,

Cardiss Collins
CARDISS COLLINS
Chairwoman

Enclosure
CC:rh

NIST
UNITED STATES DEPARTMENT OF COMMERCE
National Institute of Standards and Technology
Gaithersburg, Maryland 20899
OFFICE OF THE DIRECTOR

MAY 20 1994

The Honorable Cardiss Collins
Chairwoman
Subcommittee on Commerce, Consumer Protection,
and Competitiveness
U.S. House of Representatives
Washington, DC 20515-6120

Dear Madame Chairwoman:

Thank you for the opportunity to respond for the record to criticisms of the Mock-Up Ignition Test Method for cigarette ignition propensity developed under the Fire Safe Cigarette Act of 1990. We believe that this method and its companion, the Cigarette Extinction Test Method, are ready for use in developing a performance standard for less ignition prone cigarettes. Both methods give consistent results. We recommended the former only because it shows better differentiation among cigarettes at high ignition propensities.

The criticisms voiced by the cigarette industry at the hearing and in their written testimony are technically unsound. In the following sections, I will state the attributes of the test method, note the criticism and review the evidence demonstrating the strength of the method.

1. **The cotton duck fabrics are indicative of the performance of the aggregate of ignitable upholstery fabrics in use today.** Representatives of the cigarette industry claim this is not so. They make three arguments.

The first is that cotton duck fabrics are not actually used in upholstered furniture. While this statement is nominally true, these fabrics are accurate stand-ins for those upholstery fabrics that are susceptible to cigarette ignition. Other reputable test methods use surrogates as well. Mileage ratings for cars are obtained using a dynamometer, rather than actual road test data. The dynamometer results are deemed useful for differentiating among automobiles and demonstrating their increasing fuel efficiency. Within the fire arena, the Cone Calorimeter is an internationally-accepted apparatus for measuring the behavior of materials and products. The Cone simulates the radiation from flames using an electrically-heated coil. In both these examples and the Mock-Up Ignition Test Method, expert knowledge of the physics and chemistry of the real phenomena enables accurate design of the laboratory test.

The industry has also stated that the cotton ducks differ physically from common upholstery fabrics in weight and air permeability. The three ducks are within or near the weight range of the *ignitable* upholstery fabrics included in the industry's "500 fabric study." Further, the cigarette industry has concluded that air permeability is *not* a significant determinant of ignition susceptibility (A.M. Ihrig, A.L. Rhyne, and A.W. Spears, "Factors Involved in the Ignition of cellulosic Upholstery Fabrics by Cigarettes," *Journal of Fire Sciences* 4, 237 (1986)). This is further confirmed in the analysis in Appendix C of NIST Special Publication 851, which was appended to my testimony.

The best indication that the ignition process has been correctly simulated follows from the following response to the results of the industry's "500 fabric study." The cigarette industry argues that in this study of commercial upholstery fabrics, most of the specimens ranked experimental cigarettes differently from the cotton ducks. We have seen no documentation of their analysis, only the conclusion. We have done our own analysis of their data using standard techniques. 80 percent of their fabrics rank the cigarettes consistent with the NIST results. The remaining 20 percent show some degree of "reversals." Thus, in the aggregate, the mock-up ignition test method is accurate.

2. **Air flow effects have little impact on the relative ignition performance of cigarettes.** The cigarette industry's data in this area do not support their stance that even small air flows can make a "good" cigarette "bad." Their results and limited NIST findings are discussed in NIST Special Publication 851, pp. 30-33. The more recent RJR-sponsored study at Battelle provides further evidence that air flows effect no more than *overall* changes in ignition propensity. Battelle and RJR had concluded that as both the ignition susceptibility of the fabric and the air velocity changed, numerous "reversals" of cigarette rankings occurred. A subsequent NIST analysis of their data showed that all of those reversals were within the uncertainty of the measurements. There were no real reversals in the Battelle study. Therefore, it is reasonable to simplify the test method by using no externally-imposed air flow. (Note that there is already a significant air flow in the test box induced by the hot cigarette itself.)

3. **The reproducibility of the NIST test methods is useful and comparable to other fire tests methods used to regulate products.** The industry has improperly presented the definition of reproducibility (between-lab variance). We determined this to be about 0.4 for 48 replicate tests. This means that if a number of different laboratories test a given cigarette 48 times on a given fabric/foam assembly, there is a 95% chance that they will all get results within a range of 0.4. (Here a result of 1.0 means all 48 tests resulted in ignitions and a result of 0.0 means that none of the tests resulted in ignitions.)

4. **The Mock-Up Ignition Test Method gives results that are indicative of actual fires.** Testing done under the Cigarette Safety Act of 1984 demonstrated that mock-ups are a good indicator of the performance of real chairs made of the same materials. The industry's "500 fabric study" shows that the test method ranks cigarettes the same as the aggregate of upholstery fabrics. The Battelle and NIST studies show that externally-applied air flows move the ignition scale, but do not result in significant reversals of cigarette performance.

RJR has included in their testimony the use of the Hungarian fire experience to deprecate the method. The logic is as follows: Hungarian cigarettes perform better than U.S. cigarettes in the Mock-Up Ignition Test Method; the fire losses due to cigarettes in Hungary are worse than in the U.S. Therefore, the method gives misleading results. This logic is faulty. It presumes that all other factors contributing to fire losses are identical. This is unfounded. A simple example is as follows. Suppose that smoke detectors or residential sprinklers were introduced into all Hungarian households. The fire losses would be reduced significantly. Thus, the mock-up test method would now be seen as indicative of the real world, although the test results would be unchanged. This ignoring of other factors contributing to fire losses (*e.g.*, different home construction, furniture composition, smoking habits) also appears in the *Journal of Fire Sciences* paper alluded to in the RJR letter of April 26, 1994. That paper is therefore also fatally flawed.

In summary, the test methods developed under the Fire Safe Cigarette Act of 1990 are valid for use in evaluating the real-world ignition potential. There is no substantive evidence that a cigarette that looks "good" in the testing would perform worse than today's commercial cigarettes. There is ample evidence that cigarettes that look "good" in the testing would result in fewer ignitions and thus fewer deaths and injuries from cigarette-initiated fires.

Sincerely,

Richard G. Gann, Chief
Fire Science Division
Building and Fire Research Laboratory

INTERNATIONAL ASSOCIATION OF FIRE CHIEFS
4025 Fair Ridge Drive • Fairfax, VA 22033-2868
Telephone: 703-273-0911
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"SAFE CIGARETTE ACT OF 1994" - H.R. 3885

April 19, 1994

Mr. Chairman and honorable members of the Committee:

Regarding legislation before the United States Congress, House Subcommittee on Commerce, Consumer Protection and Competitiveness, known as H.R. 3885, we respectfully offer the following:

The International Association of Fire Chiefs (IAFC) represents approximately 10,000 Fire Chiefs and senior fire officers. Since 1873 the IAFC has been a respected leader on fire protection issues. It goes without saying that all fire agencies share a common mission and purpose: to save lives, prevent injuries and reduce property losses from the menace of fire.

The IAFC salutes the persistence and resolution of Congressman Joe Moakley and his colleagues for introducing this bill which can significantly help the fire service achieve its mission by reducing the number of fires caused by cigarettes.

Your committee is meeting today to consider the worthiness of the Fire Safe Cigarette Act of 1994. There is an old expression that goes; Where there is smoke, there is fire. That can be extrapolated to mean; Where there are cigarette smokers, there will be fires.

This has been well documented by national fire statistics collected by the National Fire Protection Association (NFPA). Cigarettes have consistently been one of the leading causes of fires and fire deaths in America.

*Providing Leadership for the fire and emergency services since 1873*
*Members, International Technical Committee for the Prevention and Extinction of Fire/Comite Technique International De Prevention Et D Extinction Du Feu (CTIF)*

Recent studies conducted under the provisions of the Fire Safe Cigarette Act of 1990 by the Consumer Product Safety Commission (CPSC) in conjunction with the National Institute of Science and Technology (NIST) have clearly proven that it is possible to manufacturer a cigarette that is essentially, fire safe.

Such a fire safe cigarette would be less likely to cause a fire if accidentally dropped into furniture or onto furnishings, according to ten years of objective testing recently concluded. H.R. 3885 continues the efforts of previous fire safe cigarette legislation.

The scientific findings, prepared by the NIST, concluded that a safer, yet marketable, cigarette could be made. In fact, five brands of cigarettes are already on the market and meet the criteria considered "safe" as determined by the studies. That proves that this is doable.

H.R. 3885 directs the CPSC to establish a cigarette fire safety standard. The years of studies are complete, it is time to enact the recommendations and get on with the business of saving lives by preventing fires.

If this bill passes there should be a demonstrable drop in the number of fires. This equates to significant reductions in civilian lives lost, reductions in the number of burn injuries and a lower amount of dollar loss of property. A reduction in the number of fires may also result in fewer injuries and deaths of firefighters. The saving of just one life would justify the need for this bill.

That is why fire service organizations, such as the IAFC, support this important legislation.

The grim statistics regarding cigarette caused fires gathered and analyzed by our esteemed associates at the NFPA provide graphic testimony that clearly identifies the connection between cigarettes and fire related death, injuries and property losses.

Consider this . . .

- FACT: Fires caused by *cigarettes* are the leading cause of fire related deaths in the United States. In 1990, the latest year for which complete statistics are available, *cigarettes* caused 25% of all fatal fires.

- FACT: *Cigarettes* started over 44,000 structural fires that resulted in 1,220 deaths, 3,358 civilian injuries and over $400 million in property damage!

- FACT: Over 100 children die each year from *cigarette* related fires!

- FACT: Every *cigarette* caused fire which firefighters must respond to increases the risk of death and/or injury to the men and women who must respond to and fight those fires!

- FACT: *Cigarettes* play a prominent role as a delay-fuse on incendiary devices used to start arson fires, such as the arson-caused wildland fires which resulted in hundreds of millions of dollars in damage, and three deaths, in southern California this past Fall!

It should come as no surprise that the tobacco industry is against this bill, saying that the tests conducted were not "real-world" tests. However, recent investigative reports by usually reliable national television networks have exposed efforts by the tobacco industry to delay attempts to require the manufacturing of a fire safe cigarette.

Isn't ten years of "testing" long enough? It is time to take action! Thank you for asking our organization to offer its professional opinion on this important matter.

Respectfully submitted,

Doug Brown, Director
Government Relations

INTERNATIONAL ASSOCIATION OF FIRE FIGHTERS

ALFRED K. WHITEHEAD
President

VINCENT J. BOLLON
Secretary-Treasurer

April 14, 1994

The Honorable Cardiss Collins, Chairman
Subcommittee on Commerce, Consumer Protection and Competitiveness
151 Ford House Office Building
Washington, DC 20515

Dear Madam Chairman:

On behalf of the nation's professional fire fighters, I wish to convey our endorsement of HR 3885, the Fire Safe Cigarette Act of 1994. We ask for your support of this vital legislation, and urge you to promptly schedule the measure for consideration in your subcommittee.

Every day, America's fire fighters witness the devastation caused by cigarette fires. Hundreds of innocent people are burned to death in their homes each year simply because someone was careless with a cigarette. Many of these victims are children. If a children's toy caused this level of devastation, we have little doubt that the federal government would move quickly to require effective safety features. The government's response to unsafe cigarettes should do no less.

In previous years, Congress stopped short of requiring that cigarettes be made fire safe largely due to concerns over whether a fire safe cigarette could be the manufactured and marketed. Such concerns are no longer valid. The recent study by the Consumer Product Safety Commission clearly demonstrated the feasibility of manufacturing and marketing fire safe cigarettes. Indeed, the Commission found that a few such cigarettes are already on the market. Moreover, information has recently come to light suggesting that cigarette manufacturers have known for years how to make cigarettes fire safe.

In short, there can be no excuse for further delay. After more than ten years of debate and two congressionally mandated studies, Congress has a responsibility to finally require that cigarettes be made fire safe.

Thank you for your efforts to address this national tragedy. If you have any questions about this issue, please do not hesitate to contact me.

Sincerely,

Alfred K Whitehead

Alfred K. Whitehead
General President

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Liggett Group Inc.
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## STATEMENT OF LIGGETT GROUP INC. CONCERNING H.R. 3885, "THE FIRE SAFE CIGARETTE ACT OF 1994"

Liggett Group Inc. submits for the record this statement summarizing its product development and research activities in the general area of fire safety. Liggett has been an active member of the Cigarette Ignition Propensity Joint Venture for research concerning the ignition propensity of cigarettes. Ignition propensity refers to the relative likelihood that a burning cigarette will ignite fabrics used in home furnishings. The Joint Venture's purpose is to "develop a valid and reliable standardized cigarette ignition propensity test method," which is the obvious starting point in developing a cigarette with a reduced likelihood of igniting fabrics used in home furnishings. In studying various test methods, the Joint Venture has made significant gains in identifying fabric characteristics which are important in determining the ignition process. On the other hand, factors related to cigarette design appear to have little effect in reducing ignition propensity of cigarettes when tested on commercial fabrics.

Internally, Liggett has diligently evaluated available technology in this area since the early 1980's in an attempt to develop a commercially acceptable reduced ignition propensity cigarette. This work has not been successful to date due in part to a lack of a test method which could provide reliable guidance in identification and modification of parameters which may affect cigarette ignition propensity. We have reason to be concerned that NIST has identified Eve Lights 120's as a "fire-safe" cigarette. Using a test method which more accurately reflects real world circumstances, Liggett's preliminary testing of Eve Light 120's on commercial fabrics, compared to other commercial cigarettes not designated as "fire-safe" by the NIST study, does not support the NIST characterization of that product as "fire-safe." Irrespective of the artificial result produced by the NIST test method, it is inconclusive, at this time, whether Eve Light 120's is "fire-safe."

In closing, we respectfully submit that given the complexity of this problem -- limiting the likelihood that a burning cigarette will ignite home furnishing fabrics -- important and significant advances have been made. However, critical questions addressing some of the more important concerns such as how to relate a test method to actual real-world materials and situations remain unresolved. We believe that, given time, more advances will be made. Congress should not attempt to rush to create a standard which will serve only to freeze technology at an early development stage and block better solutions.

**Statement of**

**Lorillard Tobacco Company**

**to the**

**Subcommittee on Commerce,**
**Consumer Protection and Competitiveness**
**Committee on Energy and Commerce**
**U.S. House of Representatives**

**April 19, 1994**

We are pleased to submit this statement regarding HR 3885, "The Fire Safe Cigarette Act of 1994.

Lorillard has devoted a considerable research effort toward the development of a commercially feasible cigarette with reduced ignition propensity. A large impediment in these efforts has been the lack of a valid method required to characterize and measure a cigarette's propensity to ignite upholstered furniture and mattresses. Consequently, much effort has gone, and is still going, into attempts to develop an understanding of the chemistry and physics involved in the ignition process, and how the important parameters should be reflected in the test procedure. The test method development research has become an industry-wide cooperative effort carried out through CORESTA and the Cigarette Ignition Propensity Joint Venture, a cooperative research and development venture, formed by the domestic manufacturers. Research results have been shared, first with the TSG and then with the TAG, in order to facilitate the formulation of a meaningful test procedure. Regrettably, this has not yet been achieved.

Although it may be possible to alter existing commercial cigarettes to show improvement in ignition propensity under the NIST method, the canvas-based cigarette extinction test developed by NIST does not represent the behavior of burning cigarettes on real upholstered furniture, and hence is not useful for predicting the relative real-world ignition propensities of different cigarettes.

Recently, Lorillard and the cigarette industry's Cigarette Ignition Propensity Joint Venture have carried out extensive evaluations of a variety of cigarettes on hundreds of commercial upholstery fabrics. The results show unequivocally that many of the best and the worst performers on canvas have equal ignition propensities when tested on upholstery fabrics, and in some cases the rankings reverse. This is equally true for experimental cigarettes used by NIST in their method development as well as for the commercial cigarettes tested by NIST.

This comes about because canvas is physically very different from upholstery fabrics and its interaction with the burning cigarette is governed by different mechanisms. The crucial difference is that canvas is very dense and nonporous. It serves as a good heat sink and impedes the access of oxygen. Thus, the canvas test, in effect, measures the extinguishability and not the ignition propensity of cigarettes. It should be clearly understood that extinguishability and ignition propensity are two distinctly different properties of cigarettes, governed by different physical-chemical mechanisms. Upholstery fabrics are generally much less dense, more porous than canvas, and not prone to extinguish cigarettes. Ignition propensity rankings depend predominantly on the interaction between cigarette burn rate and substrate characteristics, and not on the cigarettes' extinguishability.

Our research has shown that cigarette rankings based upon the outcome of the ignition test are largely controlled by the nature of the substrate (fabric and padding), and much less so by the nature of the cigarette. Hence, in order to be predictive of real-world ignition probability, the test substrates have to be representative of real upholstery materials in parameters known to be critical in the ignition process. Canvas does not satisfy that requirement, and the results of the canvas test are at best not useful, and if used as guidance towards the design of less ignition-prone cigarettes, could be potentially misleading and harmful.

The remaining technical issues to be resolved are clear. First, the results which show different ignition behaviors among commercial fabrics used in the manufacture of upholstered furniture and mattresses must be verified (the attached manuscript, recently submitted and accepted for publication in a peer reviewed journal, describes in technical terms, the results to date where two distinct fabric/cigarette interactions occur, depending on the fabric properties.) Second, the weighted distribution of the two fabric types in the marketplace must be determined. And, third, reproducible, standard fabrics must be developed that represent the two types of ignition behavior. These fabrics would then become the basis of a method to measure cigarette ignition propensity.

The NIST canvas test method development was carried out with a set of experimental cigarettes supplied by the tobacco industry. The experimental cigarettes were specially designed to investigate extremes of cigarette construction on ignition propensity without regard to commercial feasibility. The cigarettes which performed well in that test, i.e., the cigarettes that are subject to extinction, have generally somewhat impaired combustion characteristics (achieved, e.g., by low paper porosity). Impaired combustion, in turn, leads to significant changes in smoke chemistry which has detrimental implications to the toxicity of smoke as well as in the consumer acceptability. Setting standards under HR 3885 without having demonstrated commercial feasibility would be meaningless.

In conclusion, we do not believe that HR 3885, will facilitate the development of cigarettes with lower ignition propensity. Necessary research is now ongoing to develop a valid standard cigarette ignition propensity test method. To require development of cigarette standards based on the proposed NIST test would be a serious error.

# FACTORS FOR CONSIDERATION IN A TEST FOR CIGARETTE IGNITION PROPENSITY ON SOFT FURNISHINGS

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## ABSTRACT

The outcome of a cigarette ignition propensity mock-up test is largely determined by the characteristics of the fabric/substrate and to a lesser extent by the characteristics of representative cigarettes. The effects of the important cigarette variables on ignition propensity are reflected in two measurable cigarette characteristics - Mass Burn Rate (MBR) and Linear Burn Rate (LBR). MBR is related to the instantaneous heat flux and LBR is a measure of the rate of movement of the cigarette firecone on the substrate. MBR and LBR are coupled but do not vary colinearly within cigarette sets that encompass wide parameter ranges. The cigarettes' relative ignition propensity rankings can be dominated either by MBR or LBR. The substrate fabric's characteristics dictate largely which burn rate controls the ranking. Dense fabrics of appreciable thermal conductivity, such as the cotton ducks used in NIST test method development, are good heat sinks and rank cigarettes according to their extinguishability (viz. MBR). Moderate to heavy weight, less dense fabrics of higher air permeability and lower thermal conductivity are poorer heat sinks, and tend to not extinguish cigarettes but rather rank them according to the rate of pristine substrate involvement (viz. LBR). Moderate air flows impinging on cigarettes have a differential effect on the burn rate of cigarettes of different construction and thus can change the relative ignition propensity rankings of cigarettes. An investigation of the properties of 113 cellulosic upholstery fabrics which were ignitable by test cigarettes has shown that the ignition-determining properties of the duck fabrics lie on the outer fringe of the characteristics ranges of upholstery fabrics. The interaction between the majority of upholstery fabrics and cigarettes is not predominated by the extinction mechanism. Hence, the duck furniture mock-up test is a poor predictor of cigarette ignition propensity ranking on real furniture.

# FACTORS FOR CONSIDERATION IN A TEST FOR CIGARETTE IGNITION PROPENSITY ON SOFT FURNISHINGS

A. W. Spears, A. L. Rhyne and V. Norman

## I. INTRODUCTION

Two methods have been recently proposed by Ohlemiller et al in NIST Special Publication 851 for the determination of the relative ignition propensities of cigarettes (13). The first, designated as a primary test method, is a furniture mock-up method based on cotton duck fabrics and polyurethane substrate. The second method is a cigarette extinction test employing multiple layers of cellulose filter paper. These methods were subjected to interlaboratory evaluation using five experimental cigarettes, however, a number of factors related to in-home ignition of soft furnishings were either not considered or considered in only a limited fashion. The purpose of this paper is to consider these other factors and to provide some relevant data analysis indicating the parameters to be contained in an acceptable cigarette ignition propensity test method.

## II. PROPERTIES OF EXPERIMENTAL CIGARETTES THAT RELATE TO IGNITION PROPENSITY

A cigarette's propensity to ignite upholstered furnishings is a function of its Mass Burn Rate (MBR) and Linear Burn Rate (LBR). MBR reflects the rate of fuel consumption and is related to the instantaneous heat output that impinges on the substrate. LBR measures the firecone advance rate along the tobacco column and represents the length of time that a given area of the substrate is exposed to the firecone of the cigarette. The relationship between ignition propensity, and MBR and LBR is complex. Depending on cigarette construction parameters, substrate characteristics and test conditions, sometimes MBR and at other times LBR has the predominating influence. MBR and LBR are coupled but, within a set of parametrically varied cigarettes, do not generally vary colinearly. Thus, under testing circumstances where either the influence of MBR or LBR predominates, different relative ignition propensity rankings of cigarettes can be obtained.

## A. SIMPLE CORRELATION OF CIGARETTE BURN RATES IN AIR AND IGNITIONS

The original ignition propensity testing at the National Bureau of Standards was carried out with a set of 32 parametrically varied experimental cigarettes on three substrates. For this test, Gann (7) reported a poor overall coefficient of determination or squared correlation ($R^2 = 0.43$) between the number of ignitions and cigarette MBR as shown in Figure 1. There was little correlation between MBR and LBR ($R^2 = 0.11$).

The five cigarettes selected by Ohlemiller for the 1993 test evaluation, however, showed a very high degree of correlation between the burn rates ($R^2 = 0.97$). Thus, the five test cigarettes represented a very unique set. Any method that would correlate with either of the burn rates would correlate to the original NBS ignition data for these cigarettes. Much of the published data on the proposed methods are based on this unique set of five experimental cigarettes and may not be validly extrapolated to a larger universe of cigarettes.

### B. MULTIPLE CORRELATION OF EXPERIMENTAL CIGARETTE BURN RATES IN AIR AND IGNITIONS

When the ignition data for the original 32 experimental cigarettes are subjected to a logistic regression analysis with MBR and LBR as independent variables a strong coefficient of multiple determination ($R^2 = 0.82$) is obtained. Figure 3 displays this logistic curve and the individual cigarette ignitions versus their weighted MBR and LBR values. When the cigarettes are grouped by the two circumference sizes, the coefficient for the 25 mm cigarettes improves ($R^2 = 0.92$), as shown in Figure 4, whereas that for the 21mm cigarettes is not as good ($R^2 = 0.73$, Figure 5). It can be concluded that the original ignition data are significantly related to the two measurable in-air cigarette burn rates, and that error of the ignition measurements accounts for much of the unexplained variation.

A logistic model relating ignitions to the burn rate measurements could be considered as a secondary method to determine cigarette ignition propensity if one were to adopt the same standard as Ohlemiller, i.e., a selection of test cigarettes which have a functional relationship with the ignition probabilities obtained on the three original substrates selected by NIST investigators. However, it is clear that all of the cigarette/substrate ignition chemistry and physics would not be reflected in the measurement of burn rates.

As previously indicated, only a limited number of experimental cigarettes were subjected to the proposed ignition test by Ohlemiller (13). However, more recently all 32 experimental cigarettes (actually reproductions of the first 32) were evaluated using the NIST test by our laboratory and others (15). Most cigarettes were subjected to 24 replicates on each of the three duck substrates giving a total of 72 tests per cigarette. All were not measured in one laboratory. The results are shown in Table 1. Again, the logistic model associating ignition proportions with the burn rates yields a coefficient of determination, $R^2 = 0.71$ (Figure 6). Although this coefficient is somewhat less than that obtained with the original data set, the unexplained variation is in the expected range considering that only 24 replicates were run and the runs involved multiple laboratories. One should note that the duck fabrics utilized in this study and the NIST test are distinct from those used in the original NBS testing.(See discussion at III D.) Also, the estimated model parameters displayed in Figures 3 and 4 beget a comment. The magnitude of the coefficients in the logistic models along with the range of burn rate values shown in Table 1 indicate that MBR is the major contributor to shifts in ignition propensity.

These observations seem plausible, if one considers the gross heat flux to be a function of the mass burn rate when the cigarette is in contact with the substrate and the heat loss to the substrate to be a function of the linear burn rate. When the linear burn rate is greater and the cigarette coal is moving over the substrate at a faster rate, the heat loss will increase. The burning rates, in combination, are related to the net heat flux from the cigarette in contact with the fabric. One of three observations is possible: (1) The net heat flux is too low to sustain cigarette smolder and the cigarette extinguishes; (2) The cigarette net heat flux is great enough for cigarette smolder, but heat transfer to the fabric is not great enough for ignition; or (3) The cigarette net heat flux is large enough with sufficient transfer to result in substrate ignition.

## III. PROPERTIES OF SUBSTRATES THAT RELATE TO CIGARETTE IGNITION

It has been shown previously that substrate properties are very important and play a major role in the ignition process (9,10). An extensive investigation of the relationship between fabric properties and cigarette ignition was carried out in a recent 500 commercial fabric survey (5).

## A. WEIGHTED FABRIC CHARACTERISTIC

A logistic model has been previously described (9), relating cellulosic fabric parameters (weight, proclivity of the yarns to smolder, density, porosity) to cigarette smoldering ignition propensity using 33 commercial fabrics in mockups in different configurations and with different paddings. This model does not apply to cigarettes that selfextinguish when in contact with the substrate. The logistic model has the form $\theta=\mathrm{Exp}(f_i)/1+\mathrm{Exp}(f_i)$, where $\theta$ is the probability of ignition and $f_i=\beta+\Sigma_i\beta_i(X_i-\bar{X}_i)$ and where $X_i$'s are logarithms of the fabric properties (cf. Table 2), the $\bar{X}_i$'s are the means of the transformed variables and $\beta$'s are the coefficients or parameters of the model. The ignition data are the response of the fabrics to a particular cigarette. After all values have been estimated and the statistical model completed, the weighted fabric characteristic for a particular fabric may be computed. The weighted fabric characteristic is the sum of the ignition-related fabric property values after multiplication by their respective coefficients or $\beta$ values. In the 500 commercial fabric study there were 300 cellulosic fabrics and all were tested for ignition with experimental cigarette 519, a cigarette that does not selfextinguish in contact with commercial fabrics and that has a relatively high heat flux (Mass Burn Rate = 83.8 mg/min). Ignition measurements were made in a shared manner in several laboratories. Physical properties of these fabrics were measured and the previously developed logistic model was used to analyze the data. Figure 8 shows the results and indicates that the logistic model of the prior study describes the ignition behavior of the much larger number of fabrics in the more recent 500 fabric study. It can be concluded that the fabrics of both studies are of the same population and represent the best available estimate of commercial cellulosic fabrics and their properties, as reflected in ignition behavior.

## B. THERMAL CONDUCTIVITY OF FABRICS

Another property of the substrate that influences ignition propensity, particularly for cigarettes that have a tendency to selfextinguish (low MBR and high LBR) is thermal conductivity. In the case of ducks, there is a negative dependence of ignition on LBR, i.e., the faster the LBR, the lower the probability of ignition. In the case of many of the commercial fabrics discussed below, the reverse is true, and ignition probability increases with LBR. The above observations suggest that the thermal conductivity (heat sink) effect plays a much larger role in ignitions on duck fabrics than on commercial upholstery fabrics. Among prior reports that relate to this problem are: (1) A report by Ohlemiller that the cotton duck fabrics containing of the order of 5000 ppm of K+ used by NIST have a thermal conductivity that is twice that reported in the literature for cotton (12), and (2) The observation in the first CORESTA round robin ignition propensity test that ignition probability increases and then decreases as increasing amounts of potassium acetate are added to a washed fabric (California Standard)(3).

Preliminary measurements on samples prepared in our laboratory indicated that in going from a washed #4 cotton duck to one treated with 5000 ppm K+ (as potassium acetate) the thermal conductivity measured at 250°C increases from 0.323 to 0.356 W/m-K. Of course, the thermal conductance increases with fabric thickness at constant density.

### C. PROPERTIES OF DUCK FABRICS AND THEIR IGNITION BEHAVIOR

The properties of the duck fabrics may be contrasted with the properties of the cellulosic fabrics in a 500 commercial fabric survey (5). A comparison of the properties is shown in Figure 7. The alkali metal ion contents of the duck fabrics lie at the upper end of the commercial range. The weight range of the duck fabrics exceeds the upper end of the commercial range and the porosity is well below that shown by the commercial fabrics.

As a consequence of the extreme properties of the duck fabrics, one observes some ignition behaviors that are different from the general behavior of the commercial fabrics. In the Ohlemiller report the duck fabrics show a decreasing ignition propensity toward a cigarette with increasing fabric weight, whereas the commercial fabrics show an increasing ignition propensity with weight (4,9,14).

Ihrig (8) has recently observed that when the duck fabrics are employed in a laboratory-scale upholstered furniture mockup in a crevice configuration (L), popular commercial cigarettes show lower ignition propensities than when they are tested in the flat configuration. This is contrary to our prior report utilizing commercial fabrics (9). Without doubt, these reverse behaviors are a result of the relatively high thermal conductivity and low porosity of the duck fabrics. The commercial cigarettes simply selfextinguish when tested on the heaviest weight duck in the crevice configuration in which the fabric surface contact is twice that of the flat configuration where 100% ignitions occur. Another observation reported by Ohlemiller is that when the duck fabrics are used in combination with polyurethane foam, no dependence of ignition on air permeability of the foam is found. This is contrary to the published findings with commercial fabrics (10). When dealing with commercial materials, air permeability of the substrate is one of the factors which influence the availability of $O_2$ to the burning site. The very low porosity of duck fabrics eliminates substrate air permeability as an influential factor. Hence, the interaction mechanism between the burning cigarette and the duck fabrics is substantially different from that between the cigarette and commercial upholstery fabrics.

## D. PROPERTIES OF THE ORIGINAL TSG SUBSTRATES

The physical properties of duck fabrics which influence ignition behavior are very different from commercial fabrics as discussed above and shown graphically in Figure 7. The question then arises how the properties of the original fabrics and paddings used in the TSG study compare with typical upholstery fabrics. The values of the important ignition-related properties of the TSG fabrics are shown in Table 2.

Compared to the ranges of values shown in Figure 7, the Splendor fabric (16) is high in alkali metals and weight indicating that when this fabric is used in the flat configuration over polyurethane in laboratory mockups, it will be highly ignitable and represent a significant heatsink to the cigarette. Clearly, this fabric is closer to duck fabrics than to the middle of the fabric distribution. The denim fabric is in the middle part of the alkali metal ion range and middle range in weight. Here, the porosity is in the lower end of the range. Significantly, this fabric was used in the laboratory mockups in a crevice configuration, thereby increasing the heatsink effect to that of a heavier fabric and bringing its behavior closer to that of ducks. The California standard fabric is low in alkali metals and mid-range in weight and porosity, fabric property values that would not lead to ignition in the flat configuration over polyurethane. However, this fabric was used in a flat mockup over untreated cotton batting. The batting is high in alkali metal ions and represents a highly ignitable heatsink, independent of fabric properties. With this substrate the cotton batting is the first to ignite, whereas the fabrics are first to ignite over polyurethane.

It can be concluded that the original TSG substrate properties are on the fringe of the commercial ranges as described for cellulosic fabrics in the 500 fabric study. In fact, the properties cause ignition behavior of the TSG substrates to approach that of the NIST duck fabrics and they can be characterized as "Duck-like" in the following discussion.

## IV. RELATIVE CIGARETTE IGNITION PROPENSITY AND SUBSTRATE DEPENDENCE

Of the 300 cellulosic fabrics in the 500 fabric study, 113 gave ignitions with cigarette 519 and were subjected to additional ignition studies in multiple laboratories. The fabrics were tested with four cigarettes (528, 525, 508, 506) with six replicates per test (18). These cigarettes show a diversity of burning rates with 528 and 525 having the highest mass burn rates and lowest linear burn rates. Cigarette 508 has an intermediate mass burn rate and the highest linear burn rate. Cigarette 506 has the lowest mass burn rate and an intermediate linear burn rate. Previous work has indicated that alkali metal ion content, weight and porosity are the three most important fabric variables which influence ignition responses (9). The 113 ignitable cellulosic fabrics were grouped into subsets based on these parameters to determine whether fabric properties affect the relative ignition propensity rankings of cigarettes.

Parameter ranges for the various subsets are summarized in Table 3a. The "NIST" grouping represents the three duck fabrics used by NIST in their method development. Fabrics in the 113 commercial cellulosic fabric set containing high levels of alkali metal ions coupled with high weight and below average porosity were termed "Duck-like." The "Duck-unlike" grouping includes fabrics containing relatively low levels of alkali metal ions and having a low weight and no restrictions on porosity. The remaining fabrics were placed in a group called "Balance."

Table 3b summarizes the results of ignition testing on these groups of fabrics. The three groups of fabrics were equally and randomly distributed among the participating laboratories to minimize laboratory bias.

The results are as expected from consideration of the properties of the cigarettes and the fabrics. The NIST duck fabrics are extreme in properties and produce an extreme ranking of cigarettes compared to the other groupings. The high thermal conductivity and high ignitability of these fabrics result in the highest ignitability with cigarettes 525 and 528. Cigarette 508 suffers the highest heat loss as a result of its high linear burn rate, but due to its intermediate heat flux as a result of the mass burn rate it shows and intermediate ignition potential. Cigarette 506 is ranked lowest due to its combined low mass burn rate and relatively high linear burn rate. The Duck-like substances are not as extreme in properties as the duck fabrics and produce somewhat different results. This results in less effect from thermal conductivity and the cigarette with the highest burn rate appears to be more ignitionprone. The Duck-unlike fabrics would have comparatively low thermal conductivities and cigarettes with high linear burn rates would be less susceptible to selfextinguishment. The result is that cigarette 508 is more ignitionprone than the other three at 1% level of significance. The other three cigarettes are not significantly different from each other. Thus, the lowest ignition propensity cigarette on the NIST duck fabrics has become equal to the highest ignition propensity cigarettes and the intermediate ignition propensity cigarette has become the most ignition-prone, when tested on the Duck-unlike fabrics. Why cigarette 508 becomes more ignition-prone than 528 and 525 is not clear; however, we chose to speculate as follows: ignition of fabric is a two stage mechanism, involving pyrolysis and the formation of oxygen-reactive char. The greater the rate of char formation, the greater the likelihood of ignition. Once cigarette 508 is not subject to extinction, when in contact with lighter weight and lower alkali metal ion fabrics, it produces char at a greater rate than the other cigarettes as a result of its high linear burn rate. The higher rate of char formation is manifest in higher ignition propensity. On the remaining "Balance" group of fabrics the ignition propensities of the four cigarettes do not differ significantly.

The correlations between burn rates and ignition probabilities for cigarettes 506, 508, 525 and 528 on the three groupings of fabrics are shown in Table 4. For the Duck-like grouping MBR was a significant correlate. For the Duck-unlike grouping, on the other hand, MBR was no longer significant while LBR became significant, i.e., for that group of fabrics, the faster the fire-cone moves over the substrate, the more ignitions take place. Results of the fabric divisions and cigarette rankings are graphically depicted in Figures 9, 10 and 11.

## V. AIR FLOW EFFECTS

For a free-burning cigarette, at 21% ambient $O_2$ concentration, the actual concentration 1mm from the firecone has been reported to be about 8.5% (2). Any external influences such as air movement, substrate permeability and the location where the cigarette rests (crevice, flat cushion) would be expected to influence this concentration and hence the availability of $O_2$ to the burning site. This, in turn would influence the cigarette burn rate and its interaction with the substrate. It has been reported that body heat can induce air flows on furniture cushion surfaces near the cushion-arm crevice and that such flows are of the order of 5cm/sec. (6). Comparative cigarette-substrate ignition tests have been conducted under quiescent conditions and with low imposed air flow rates similar to that above, and reversals in relative cigarette ignition propensity rankings have been reported (1). Wu, et. al., have also reported similar reversals in experiments where different imposed $O_2$ concentrations were used to simulate the effect of variables such as air flow which affect $O_2$ availability (19).

When a modest air flow is directed at the cigarette firecone, its LBR, MBR, and ignition propensity should increase (cooling effects are insignificant at these low flow rates). Table 5 summarizes some LBR measurements conducted on the four test cigarettes (506, 508, 525 and 528) and a selection of additional cigarettes from NIST's 32 experimental cigarette sets conducted under quiescent conditions and at a flow rate of 5cm/sec. The relative standard deviations are of the order of 5% under both the quiescent and imposed air flow conditions. Sample sizes were respectively 5 and 10 for these two conditions. The results show that cigarettes with different construction parameters have quite different burn rate responses to an imposed air flow. Since the burn rate is coupled to the ignition response, it is expected that the ignition propensities of different cigarettes would change at different rates under an imposed air flow and that the relative ignition propensity rankings of different cigarettes can change.

Table 6 summarizes the results of some LBR measurements conducted on NIST cigarettes at different ambient $O_2$ concentrations. Again, there are marked differences in how cigarettes with different consruction parameters respond to increased $O_2$ availability. With one exception (Cigarette 506), a 2% increase in ambient $O_2$ concentration is approximately equivalent to the imposition of a 5cm/sec air flow.

## VI. CONCLUSIONS

The proposed NIST test method provides a measure of cigarette ignition propensities that is not representative of those found on commercial fabrics. Changes in rankings occurred when a selected range of commercial fabrics was used for cigarette ignition propensity testing. Only a selected group of commercial fabrics whose properties lie in the direction of duck fabrics gave results which were close to the NIST ignition test, however, these results do not represent the majority of fabrics. No data exist, at the moment, that would afford conclusions about the in-home use and the weighted average of fabric properties associated with upholstered furniture and mattresses. It is, however, apparent from fabric surveys that the properties of duck are not representative of commercial fabrics.

Air movement appears to play a significant role in the real world fire scenario and it can change the ignition propensity rankings of cigarettes. A logical basis for differing air flow effects on the ignition propensity of cigarettes exists. For this reason, a test capable of predicting real world ignition probabilities should include an air flow component.

Since the quiescent NIST duck test is representative neither of the spectrum of commercial upholstery fabrics nor of the prevalent real world conditions, its adoption as a definitive test for ranking cigarettes can lead to erroneous conclusions. This lack of concordance with the field parameters can conceivably lead to increased fire risks if the test is used as a guideline for modifying cigarettes.

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19. Wu, E-C., A. M. Ihrig and V. Norman, "Ignition Propensity Testing at Different $O_2$ Concentrations," J. Fire Sciences, 10, 365-385 (1992).

TABLE 1 - Ignition Probability of 500 Series Cigarettes Using the NIST Test

| CIG NO | IGN PROB | MBR | LBR |
|---|---|---|---|
| 501 | 0.69 | 53.6 | 5.80 |
| 502 | 0.74 | 43.8 | 4.92 |
| 503 | 0.90 | 67.1 | 7.22 |
| 504 | 0.90 | 60.4 | 6.49 |
| 505 | 0.31 | 49.2 | 8.05 |
| 506 | 0.14 | 38.5 | 6.21 |
| 507 | 0.50 | 54.5 | 8.87 |
| 508 | 0.35 | 49.6 | 8.05 |
| 509 | 1.00 | 45.9 | 3.88 |
| 510 | 1.00 | 38.2 | 3.21 |
| 511 | 1.00 | 56.3 | 4.77 |
| 512 | 1.00 | 50.2 | 4.20 |
| 513 | 0.13 | 38.6 | 6.16 |
| 514 | 0.00 | 30.6 | 4.79 |
| 515 | 0.42 | 45.4 | 7.16 |
| 516 | 0.24 | 37.9 | 5.97 |
| 517 | 1.00 | 70.7 | 5.83 |
| 518 | 1.00 | 56.1 | 4.85 |
| 519 | 1.00 | 83.8 | 7.28 |
| 520 | 1.00 | 71.6 | 6.04 |
| 521 | 0.64 | 60.1 | 6.98 |
| 522 | 0.47 | 46.5 | 5.25 |
| 523 | 0.65 | 71.0 | 9.49 |
| 524 | 0.50 | 57.1 | 7.74 |
| 525 | 1.00 | 57.1 | 3.94 |
| 526 | 1.00 | 46.6 | 3.22 |
| 527 | 1.00 | 69.3 | 4.01 |
| 528 | 1.00 | 58.5 | 4.07 |
| 529 | 0.11 | 43.3 | 5.15 |
| 530 | 0.00 | 33.1 | 3.96 |
| 531 | 0.65 | 54.4 | 6.45 |
| 532 | 0.40 | 40.9 | 4.86 |

TABLE 2 - Properties of TSG Fabrics

| FABRIC | WT* | PROCLIVITY | POROSITY ** | DENSITY (g/cc) | Na+K+ (ppm) |
|---|---|---|---|---|---|
| Denim | 13.9 | 2.1 | 2150 | .50 | 1435 |
| CA.Std. | 9.6 | 1.1 | 3770 | .40 | 662 |
| Splendor | 15.8 | 50 | 4440 | .34 | 5479 |

* oz/yd$^2$
** CORESTA Units

TABLE 3-A - Fabrics Groupings

| Characteristics | DUCK FABRICS | | DUCK LIKE | | DUCK UNLIKE | | BALANCE |
|---|---|---|---|---|---|---|---|
| | RANGE | AVG. | RANGE | AVG. | RANGE | AVG. | AVG. |
| NA - K | 4327-5393 | 4706 | >1600 | 2351 | 800 - 1800 | 1406 | 2349 |
| Weight | 15 - 24 | 20.1 | >15.5 | 16.76 | 9.5 - 15.5 | 12.7 | 11.5 |
| Porosity | 425 - 650 | 537 | <7000 | 4314 | -- | 7167 | 6350 |
| Sample Size | NA | -- | 21 | -- | 24 | -- | 68 |

TABLE 3-B - Percent Ignition

| Cigarettes | Duck Fabrics | Duck-Like | Duck-Unlike | Balance |
|---|---|---|---|---|
| # 506 | 14.0 | 21.4 | 43.1 | 52.5 |
| # 508 | 35.0 | 50.8 | 61.1 | 61.0 |
| # 525 | 100 | 90.5 | 43.8 | 68.6 |
| # 528 | 100 | 87.3 | 34.7 | 66.2 |

TABLE 4 - Summary of the Logistic Regression of Ignition Proportions on MBR and LBR. Cigarettes 506, 508, and 525, and 528.

| | Coefficient of Determination | Coefficients of Model | | |
|---|---|---|---|---|
| | $R^2$ | Constant | $B_1$(LBR) | $B_2$(MBR) |
| Duck-like | 0.984 | -5.7505 | N.S. | 0.1502 |
| Duck-unlike | 0.744 | -1.2912 | 0.2001 | N.S. |
| Balance | 0.956 | -1.1352 | N.S. | 0.03211 |

TABLE 5 - Effect of Air Flow on LBR

| | (Air Flow cm/sec) | | |
|---|---|---|---|
| Cigarettes | 0 | 5 | %Change |
| 523 BEHC-25 | 8.70 | 9.83 | 13.0 |
| 507 BEHC-21 | 8.31 | 9.70 | 16.7 |
| *508 BEHN-21 | 7.64 | 8.06 | 5.5 |
| 519 BNHC-25 | 7.01 | 7.65 | 9.1 |
| 503 BNHC-21 | 6.52 | 7.33 | 12.4 |
| *506 BELN-21 | 5.99 | 7.44 | 24.2 |
| 513 FELC-21 | 5.82 | 6.29 | 8.1 |
| 501 BNLC-21 | 5.34 | 6.00 | 12.4 |
| 529 FELC-25 | 4.98 | 5.43 | 9.0 |
| 518 BNLN-25 | 4.57 | 4.94 | 8.1 |
| 514 FELN-21 | 4.55 | 4.97 | 9.2 |
| 527 FNHC-25 | 4.35 | 4.99 | 14.7 |
| *528 FNHN-25 | 4.08 | 4.44 | 8.8 |
| 530 FELN-25 | 3.94 | 4.21 | 6.9 |
| *525 FNLC-25 | 3.72 | 3.91 | 5.1 |
| 510 FNLN-21 | 3.01 | 3.31 | 10.0 |

*Cigarettes used in the fabric evaluation test.

The cigarette identification acronym has the following meaning:

First letter: B= burley, F= flue-cured tobaccos

Second letter: E= expanded, N= non-expanded tobaccos

Third letter: H= high, L= low paper porosities

Fourth letter: C= citrate, N= no paper additive

Last digit: 25 mm, 21 mm cigarette circumferences

TABLE 6 - Effect of $O_2$ Concentration on LBR

| Cigarette | | $O_2$ Concentration | | Change from |
|---|---|---|---|---|
| | 19% | 21% | 23% | 21 to 23 (%) |
| *508 BEHN-21 | 7.16 | 7.64 | 8.63 | 13.0 |
| 519 BNHC-25 | 6.37 | 7.01 | 7.69 | 9.7 |
| *506 BELN-21 | 5.90 | 5.99 | 9.13 | 52.4 |
| 529 FELC-25 | 4.29 | 4.98 | 5.45 | 9.4 |
| *528 FNHN-25 | 3.66 | 4.08 | 4.43 | 8.6 |
| *525 FNLC-25 | 3.07 | 3.72 | 3.88 | 4.3 |

*Cigarettes used in the fabric evaluation test.

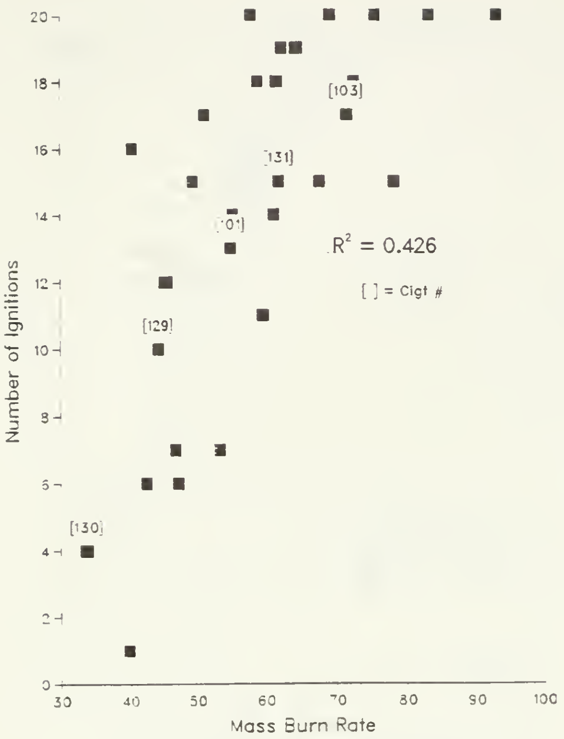


FIGURE 1 - TSG Related Data

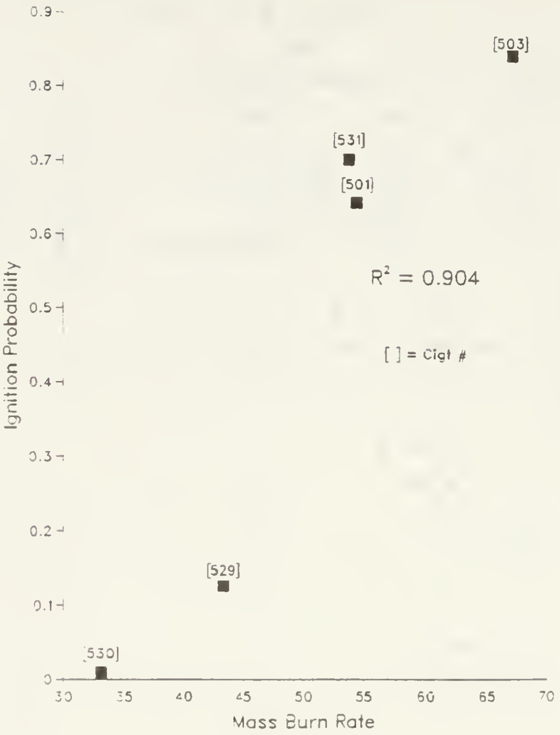


FIGURE 2 - Round Robin Results (Duck Fabrics)

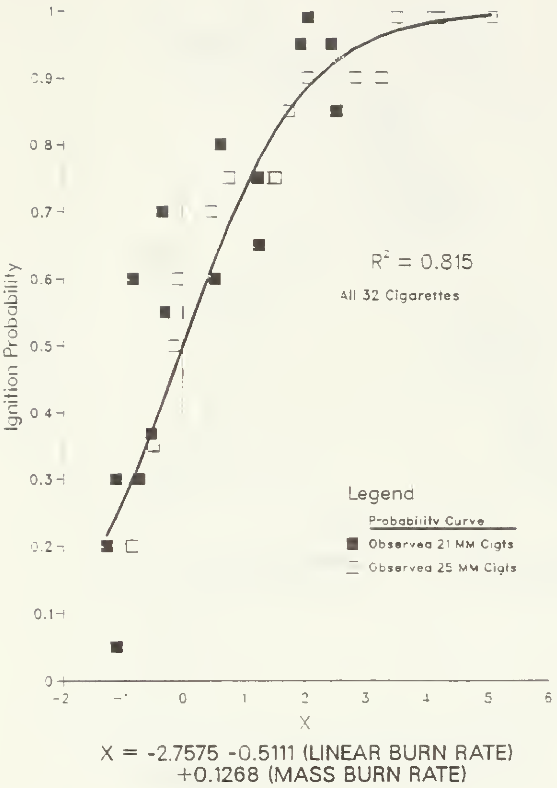


FIGURE 3 - Ignitions TSG Fabrics vs. Cigt. Burn Rates

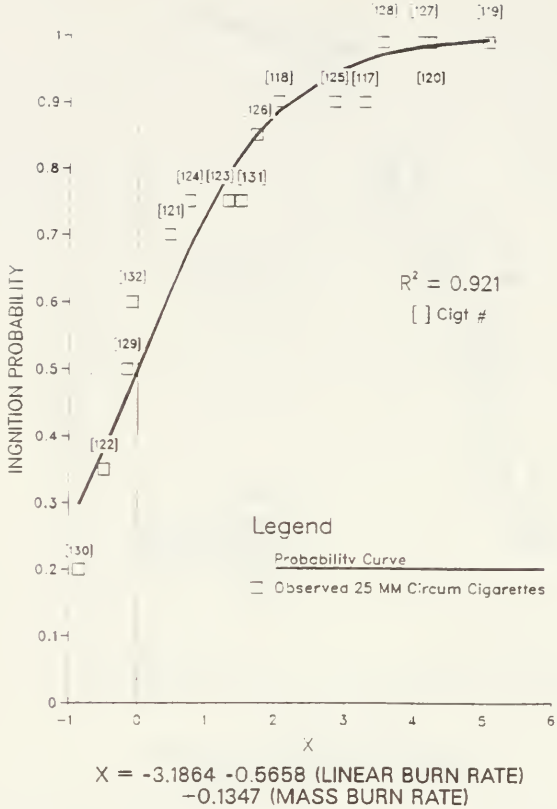


FIGURE 4 - Ignition TSG Fabrics vs. Cigt. Burn Rates

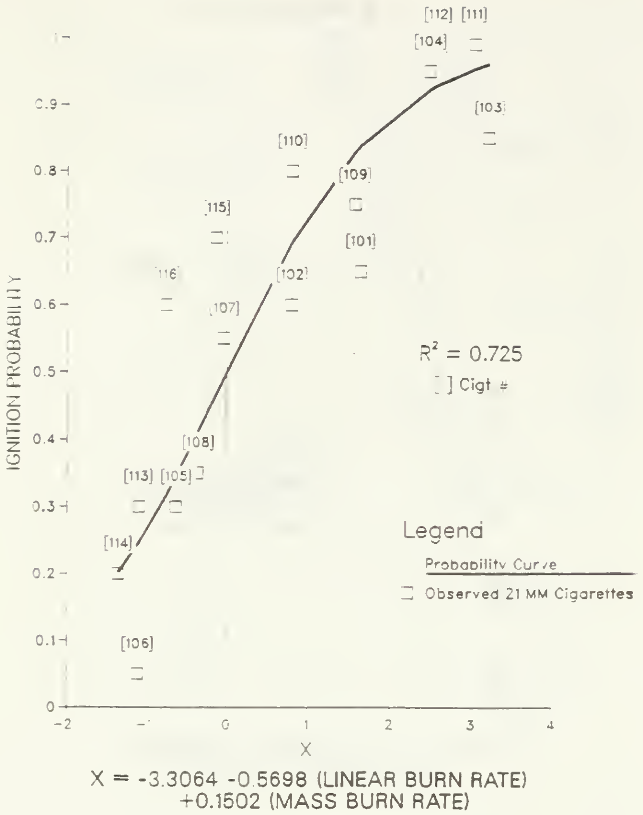


FIGURE 5 - Ignitions TSG Fabrics vs. Cigt. Burn Rates

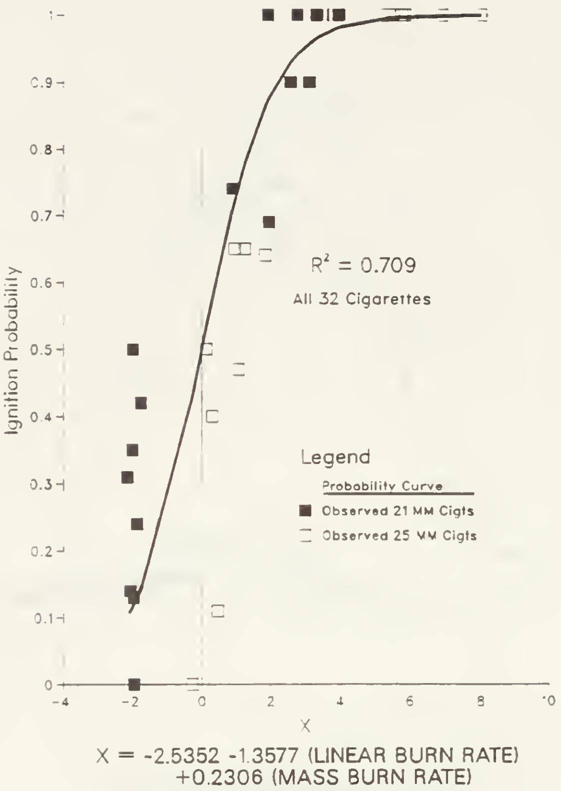


FIGURE 6 - Ignitions Duck Fabrics vs. Cigt. Burn Rates (500 Series)

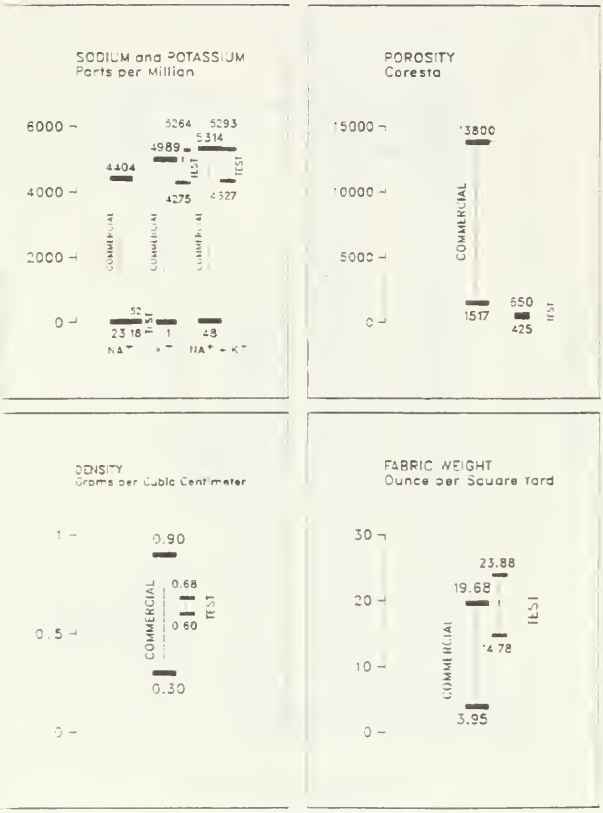
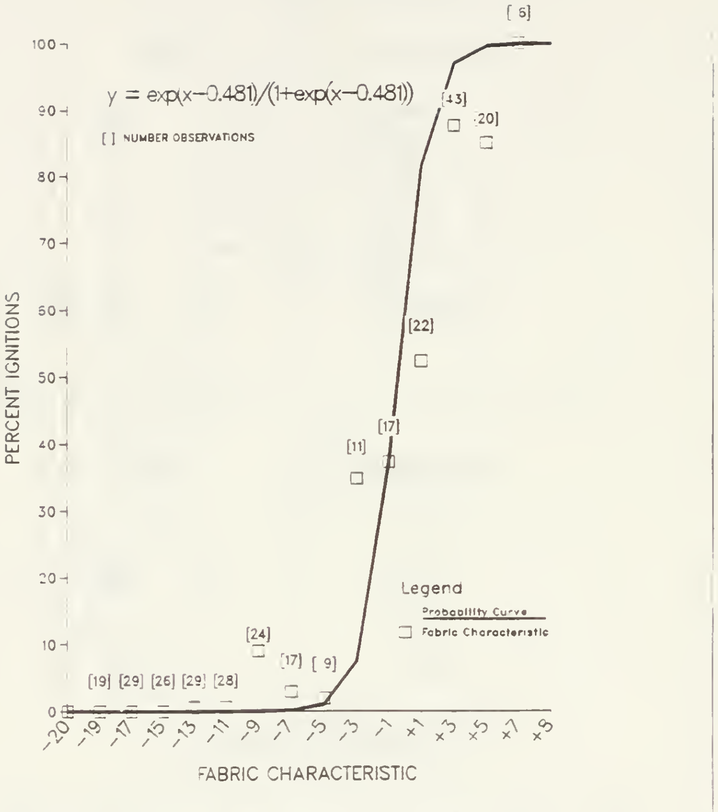


FIGURE 7 - Comparison of 100% Cellulosic Commercial Fabric with Test Fabric Showing Range of Fabric Characteristics



FABRIC CHARACTERISTIC is a function
of Fabric Weight, Density and Proclivity

FIGURE 8 - Ignitions Percent vs. Fabric Characteristics 300 Cellulostic (100%) Fabrics

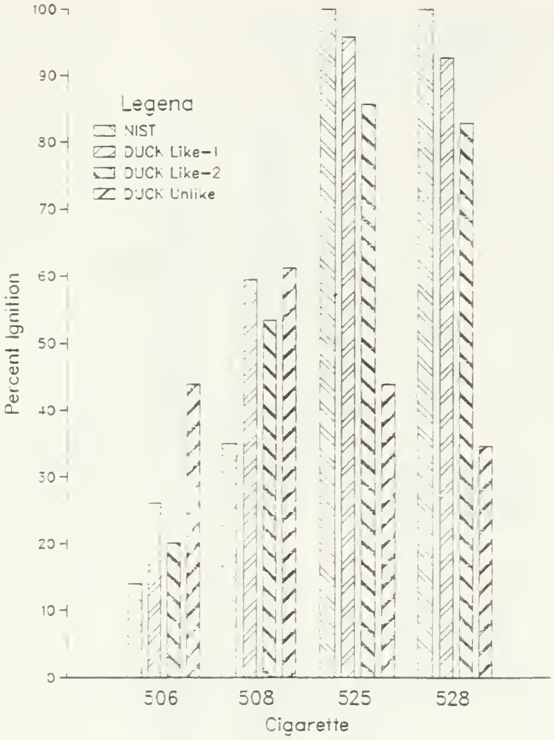


FIGURE 9 - Comparison of NIST Results to Subgroupings of Cellulostic Fabrics

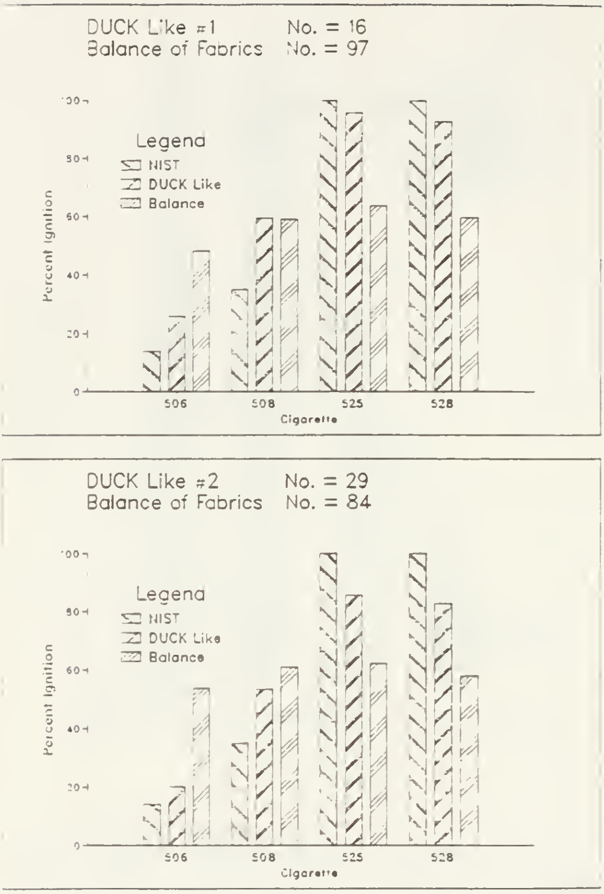


FIGURE 10 - Duck Like #1 Duck Like #2

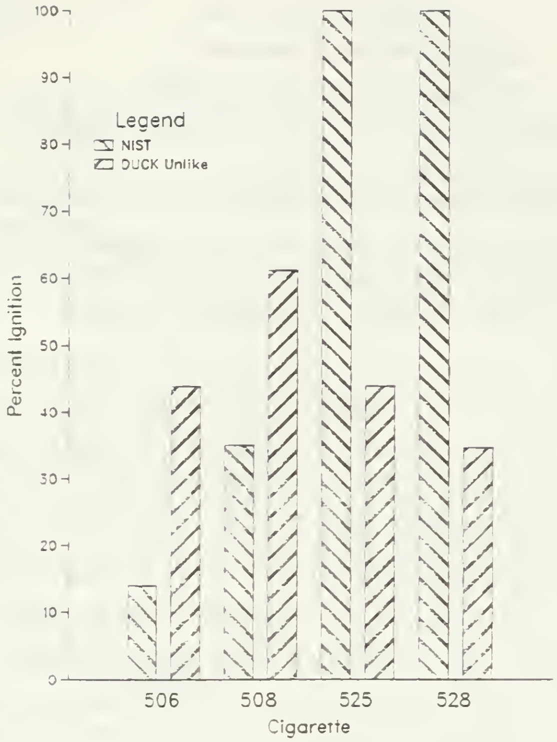


FIGURE 11 - Comparison of NIST Results to Subgroupings of Cellulostic Fabrics

## DR. JOHN R. HALL, JR.
## ASSISTANT VICE PRESIDENT
## FIRE ANALYSIS & RESEARCH
## NATIONAL FIRE PROTECTION ASSOCIATION

Madam Chairwoman, I am Dr. John R. Hall, Jr. and I am the Assistant Vice President for Fire Analysis and Research of the 60,000+ member National Fire Protection Association (NFPA). At NFPA, we define our mission to be the safeguarding of people, their property, and the environment from destructive fire and related hazards such as electric shock.

Part of our ongoing work in support of that mission consists of analysis of patterns and trends in America's fire experience that may help in achieving our goal of fire safety. We routinely track the overall size of the U.S. fire problem and the size of its major parts, such as fires due to cigarettes or other lighted tobacco products. We also perform many special studies of promising fire safety programs, such as the fire safe cigarette.

As NFPA President George Miller stated in his recent letter to you, we believe there is no other current fire safety initiative that could have such a widespread impact on fire deaths in this country as H.R. 3885, the Fire Safe Cigarette Act of 1994. The letter noted these key facts:

- Smoking materials are the leading cause of fire deaths in the U.S.

- Every year during the 1980s, smoking material fires caused more than 1,000 civilian deaths, more than 3,000 civilian injuries and roughly $300 million in direct property damage.

- About 25 percent of all residential structure fire deaths are caused by smoking materials.

- Among the victims of these fires are the very young and the elderly.
- Cigarette fires kill non-smokers and smokers alike; the risk is not limited to those who choose to smoke.

In this statement I hope to amplify these points and provide more of the reasons we feel support for this legislation is so essential.

I last appeared before this subcommittee on May 16, 1990, to testify in support of what would become the Fire Safe Cigarette Act of 1990 (P.L. 101-352). Since that time four years ago, we estimate that another 4,000 Americans have died from smoking-material fires. The bill you are considering now, HR 3885, is the direct descendant of the 1990 act. NFPA strongly supports the passage of HR 3885 and considers it essential to the accomplishment of the goals set out in the Fire Safe Cigarette Act of 1990 and the earlier Cigarette Safety Act of 1984.

As we speak, smoking materials -- which is to say, lighted tobacco products, nearly all of them cigarettes -- remain the #1 cause of fatal fires in the U.S. They account for roughly one of every five people killed by fire in the U.S. and roughly one of every four killed in a building or structure fire. No other major cause of fatal fires comes close, and no other major cause is likely to take over the dubious distinction of #1 cause of fire deaths any time soon -- unless or until this legislation is enacted.

Our latest statistics are for 1992. For that year, we estimate there were 163,100 smoking-material fires reported to U.S. fire departments, with associated losses of 1,075 civilian deaths, 3,259 civilian injuries, and $318 million in direct property damage. In particular, that death toll represented a 13 percent increase over 1991, reversing at least temporarily what had been a steady and substantial downward trend. (See Table 1 and the appendix to this statement for more details on patterns and trends.)

The facts and figures demonstrate that we still have a large problem with smoking-material fires. They indicate that the smoking-material fire problem is declining, both in numbers and as a share of total fire deaths. But the facts also indicate that the death toll from smoking-material fires will continue to be unacceptably large for a long time to come if nothing happens to change present trends. In HR 3885, we have something that could dramatically change those trends.

The Cigarette Safety Act of 1984 initiated a series of studies to determine whether a more ignition-resistant cigarette might be possible. Three years after passage of the act, in an October 1987 research report done under its auspices, NFPA concluded that "exclusive use of any of the five tested experimental cigarettes would be expected to reduce ... projected losses by sizeable percentages" and "even the lowest-impact cigarette ... would be expected to reduce deaths by 64% by 1996" relative to what they otherwise would be. The Technical Study Group overseeing these studies, which included a representative from NFPA, concluded more broadly that "it is technically feasible ... to develop cigarettes that will have a significantly reduced propensity to ignite upholstered furniture or mattresses," the two classes of items that account for more than four of every five fatal smoking-material structure fires.

Meanwhile, in the three years required to perform these studies, more than 4,500 people were killed by fires started by smoking materials.

Nearly three more years would pass before the enactment of the Fire Safe Cigarette Act of 1990. During that time, cigarettes continued to be constructed as they always had been. And more than 4,000 more people lost their lives to smoking-material fires as the nation discussed what to do next.

In August 1990, the Fire Safe Cigarette Act of 1990 initiated a series of studies to confirm the feasibility of a standard test, suitable for routine use, of the ignition propensity of a cigarette and to confirm that the physical properties of cigarettes found to correlate with ignition propensity in the laboratory were also correlated with fire risk in the real world.

In August 1993, NFPA's special study of the latter question concluded "modeling showed four cigarette characteristics to be significant -- filter, filter length, porosity, and pack type. Filter, filter length and porosity all affect air intake, which therefore appears to be an important physical element in the combustion process associated with risk." The U.S. Consumer Product Safety Commission (CPSC), as the lead agency coordinating the series of studies, was responsible for assessing what all the studies meant, and they stated in their overview report, "The Commission shares NIST's and the [Technical Advisory Group's] conclusion that the research during the present study, together with research undertaken from 1984 to 1987, establishes the validity and reliability of their test methods within reasonable limits." CPSC therefore concluded that "it is practicable to develop a performance standard to reduce cigarette ignition propensity," which would include the test method and other elements such as acceptance criteria. In other words, if we as a nation choose to reduce cigarette ignition propensity, the tools are there to do so.

While our latest statistics cover only the years through 1992, recent trends are clear enough that we may say with confidence that nearly 3,000 people died from smoking-related fires between the enactment of the Fire Safe Cigarette Act of 1990 and the issuance of these conclusions. Or, more than 11,000 people have died between the passage of the Cigarette Safety Act of 1984 and the conclusion of the Fire Safe Cigarette Act of 1990.

Since then, an average of 20 people a week have died from smoking-related fires and will continue to die, until or unless we find a way to put into practice the lessons from these many studies. Every week that these hearings go on -- an average of 20 smoking-material fire deaths. Every week that this bill travels through the two houses of Congress -- an average of 20 fire deaths. Every week spent on further refinements to the test method or further steps in completing the performance standard -- an average of 20 fire deaths. And every week spent on any other form of delay in the implementation of a more ignition-resistant cigarette -- an average of 20 fire deaths.

NFPA urges passage of H.R. 3885, and we would be pleased to testify before your subcommittee should you schedule additional hearings. We thank you for the opportunity to present this written statement, and we hope that it creates for you and the rest of the subcommittee a clear and compelling image of a ticking clock, counting the deaths due to cigarette-initiated fires -- 20 a week, three a day -- deaths that we now know, from the research conducted over the past decade, are mostly preventable, if we only act on the technical knowledge we have today. NFPA urges the subcommittee to act, and to actquickly, so that no more unnecessary fire deaths need occur.

## Appendix
## Fact Sheet on Patterns of the Smoking Material Fire Problem

A significant share of the decline in smoking-material fire deaths may be traced to a decline in smoking behavior, as Table A-1 shows. Another part of the decline parallels the decline in fire death tolls from all the major causes, a decline that we believe owes much to the nearly universal adoption of home smoke detectors since the mid-1970s. Note, however, that even though most American homes now have smoke detectors and have for some time, the majority of recent fatal smoking-material fires occurred in the small fraction of homes that did not. (See Table A-2.)

Table A-3 indicates some of the reasons why smoke detectors might have been unable to save more of the people killed by smoking-material fires. Nearly one-third of the fatal victims have special vulnerabilities, ranging from impairment by alcohol or drugs to age-related limitations to physical handicaps or mental impairments.

Smoking-material fires kill and injure both smokers and non-smokers alike. Table A-4 shows that nearly half the fatal and non-fatal victims of smoking-material fires were in another room than the room where fire began when they received their injuries. Table A-5 shows that roughly 10% of the fatal victims are children under the age of 18 -- and typically under the age of 10 -- who are very unlikely to have been the smokers responsible for the fires that killed them. Table A-5 also shows that another one-third of fatal victims are at least 65 years old, a high-risk group for injury and death from fire but a group that is only half as likely to smoke as the rest of the adult population.

Most fatal smoking-material fires do not involve falling asleep while smoking -- the generalization of the familiar smoking-in-bed scenario. (See Table A-6.) Instead, a lighted tobacco product is typically discarded or disposed of in a careless manner that leaves it unextinguished and in contact with a combustible material, often out of sight. This allows smoldering combustion to begin and develop unobserved, with transition to flaming ignition much later -- often hours later after the smoker has left the room. This is consistent with the fact that more than half the fatal smoking-material fires begin with ignition of upholstered furniture (see Table A-7).

In this document, the term "smoking materials" has been used consistently to refer to any lighted tobacco product but not to lighting implements, such as matches or lighters. Table A-8 demonstrates that nearly all of these smoking-material fires, where the type of smoking material is reported and classified, involve cigarettes specifically.

**Table 1. Trends in Major Parts of the U.S. Smoking-Material Fire Problem**

| Year | Total Fires | Civilian Deaths in Structure Fires | Civilian Injuries in Structure Fires | Direct Property Damage in Structure Fires (in Millions) |
|---|---|---|---|---|
| 1980 | 347,300 | 1,962 | 5,054 | $475 |
| 1981 | 334,200 | 2,188 | 5,163 | $424 |
| 1982 | 265,800 | 1,757 | 4,348 | $408 |
| 1983 | 227,900 | 1,600 | 4,451 | $356 |
| 1984 | 240,500 | 1,589 | 3,879 | $388 |
| 1985 | 248,100 | 1,685 | 3,774 | $409 |
| 1986 | 231,200 | 1,454 | 3,436 | $389 |
| 1987 | 232,100 | 1,463 | 3,616 | $379 |
| 1988 | 230,500 | 1,637 | 4,172 | $427 |
| 1989 | 207,900 | 1,242 | 3,399 | $464 |
| 1990 | 196,300 | 1,219 | 3,358 | $400 |
| 1991 | 187,100 | 932 | 3,219 | $534 |
| 1992 | 163,100 | 1,062 | 3,097 | $303 |

Sources: 1980-1992 data from National Fire Incident Reporting System (NFIRS) and NFPA survey.

Numbers of fires are expressed to the nearest hundred, civilian deaths and injuries to the nearest one, and direct property damage to the nearest million dollars. The 1991 direct property damage figures for residential fires are inflated by estimation problems related to the handling of the Oakland fire storm.

## Table A-1. Trend in U.S. Cigarette Consumption

| Year | Cigarettes Consumed (in Billions) |
|---|---|
| 1980 | 618.57 |
| 1981 | 627.70 |
| 1982 | 624.01 |
| 1983 | 596.19 |
| 1984 | 600.23 |
| 1985 | 595.14 |
| 1986 | 582.84 |
| 1987 | 577.20 |
| 1988 | 550.00 |
| 1989 | 540.00 |
| 1990 | 525.00 |
| 1991 | 510.00 |

Sources: John C. Maxwell, Jr., *The Maxwell Report: Revised Year-End Sales Estimates for the Cigarette Industry*, New York: Furman, Selz, Mager, Dietz and Birney, February, 1981-87 issues; John C. Maxwell, Jr., *The Maxwell Consumer Report: 1988 Year-End Sales Estimates for the Cigarette Industry*, Richmond: Wheat First Securities, January 27, 1989; *The Tobacco Situation and Outlook Report*, Economic Research Service, U.S. Department of Agriculture, September 1992.

**Table A-2. Victims of Smoking-Material Fires in Residential Structures**

**and Automatic Detection Performance, 1987-1991 Annual Average of Fires Reported to U.S. Fire Departments**

**Unknown Detector Performance Allocated Proportionally**

| Automatic Detector Performance | Civilian Deaths | Civilian Injuries |
|---|---|---|
| No detectors present | 663 (52.5%) | 1,427 (44.0%) |
| Detectors present | 540 (43.0%) | 1,761 (54.3%) |
| Unclassified performance of equipment | 58 (4.6%) | 55 (1.7%) |
| Total* | 1,262 (100%) | 3,243 (100%) |

*Totals may not equal sums due to rounding error.

Source: 1987-1991 NFIRS, NFPA Survey

## Table A-3. Condition (Before Injury) of Victims of Smoking-Material Fires in Residential Structures,

1987-1991 Annual Average of Fires Reported to U.S. Fire Departments

Unknown-Condition Victims Allocated Proportionally

| Condition | Civilian Deaths | Civilian Injuries |
|---|---|---|
| Asleep | 729 (57.7%) | 1,728 (53.3%) |
| Impaired by drugs or alcohol | 230 (18.3%) | 307 (9.5%) |
| Bedridden, physically handicapped | 111 (8.8%) | 85 (2.6%) |
| Awake and unimpaired | 89 (7.0%) | 957 (29.5%) |
| Too old to act effectively | 27 (2.1%) | 47 (1.5%) |
| Senile, mentally handicapped | 25 (2.0%) | 28 (0.9%) |
| Too young to act effectively | 24 (1.9%) | 45 (1.4%) |
| Under restraint | 0 (0.0%) | 1 (0.0%) |
| Unclassified condition | 27 (2.2%) | 45 (1.4%) |
| Total | 1,262 (100%) | 3,243 (100%) |

*Totals may not equal sums because of rounding error.

Source: 1987-1991 NFIRS, NFPA Survey

**Table A-4. Locations (at Ignition) of Victims of Smoking-Material Fires in Residential Structures,**

**1987-1991 Annual Average of Fires Reported to U.S. Fire Departments**

**Unknown-Location Victims Allocated Proportionally**

| Location | Civilian Deaths | Civilian Injuries |
|---|---|---|
| Intimately involved with ignition | 367 (29.1%) | 740 (22.8%) |
| In same room as fire origin but not intimately involved | 324 (25.7%) | 756 (23.3%) |
| On same floor as fire origin but not in same room | 367 (29.1%) | 796 (24.5%) |
| In same building as fire origin but not on same floor | 190 (15.0%) | 707 (21.8%) |
| Other | 14 (1.1%) | 244 (7.5%) |
| Total | 1,262 (100%) | 3,243(100.0%) |

*Totals may not equal sums due to rounding error.

Source: 1987-1991 NFIRS, NFPA Survey

Table A-5. Age by Sex of Victims of Smoking-Material Fires in Residential Structures,

1987-1991 Annual Average of Fires Reported to U.S. Fire Departments

Victims of Unknown Age or Sex Allocated Proportionally

| Age | 1989 Population (in Millions) | Civilian Deaths | Death Rate per Million People | Civilian Injuries | Injury Rate per Million People |
|---|---|---|---|---|---|
| Male | | | | | |
| Under 5 | 9.60 | 49 | 5.1 | 68 | 7.1 |
| 5-9 | 9.32 | 20 | 2.1 | 36 | 3.9 |
| 10-13 | 6.98 | 4 | 0.6 | 30 | 4.3 |
| 14-17 | 6.92 | 5 | 0.7 | 66 | 9.5 |
| 18-29 | 24.42 | 113 | 4.6 | 484 | 19.8 |
| 30-39 | 20.93 | 127 | 6.1 | 463 | 22.1 |
| 40-54 | 20.44 | 151 | 7.4 | 371 | 18.2 |
| 55-64 | 10.20 | 117 | 11.5 | 187 | 18.3 |
| 65-74 | 8.09 | 110 | 13.6 | 162 | 20.0 |
| 75-84 | 3.69 | 70 | 19.0 | 99 | 26.8 |
| 85 and over | .85 | 34 | 40.0 | 32 | 37.6 |
| Total | 121.45 | 800 | 6.6 | 1,998 | 16.5 |

**Female**

| | | | | | |
|---|---|---|---|---|---|
| Under 5 | 9.16 | 25 | 2.7 | 63 | 6.9 |
| 5-9 | 8.89 | 16 | 1.8 | 28 | 3.1 |
| 10-13 | 6.64 | 3 | 0.5 | 18 | 2.7 |
| 14-17 | 6.57 | 8 | 1.2 | 36 | 5.5 |
| 18-29 | 23.98 | 39 | 1.6 | 267 | 11.1 |
| 30-39 | 20.96 | 47 | 2.2 | 205 | 9.8 |
| 40-54 | 21.38 | 64 | 3.0 | 187 | 8.7 |
| 55-64 | 11.39 | 59 | 5.2 | 129 | 11.3 |
| 65-74 | 10.09 | 98 | 9.7 | 154 | 15.3 |
| 75-84 | 6.07 | 81 | 13.3 | 119 | 19.6 |
| 85 and over | 2.19 | 20 | 9.1 | 36 | 16.4 |
| Total | 127.32 | 460 | 3.6 | 1,243 | 9.8 |

Totals may not equal sums due to rounding error.

Sources: 1987-1991 NFIRS, NFPA Survey and *United States Population Estimates, by Age, Sex and Race and Hispanic Origin: 1989*, Current Population Reports, Washington: U.S. Department of Commerce, Bureau of the Census, Series P-25, No. 1057, March 1990.

## Table A-6. Causes of Smoking-Material Fires in Residential Structures, 1991

Unknowns Allocated

| Cause | Fires | Civilian Deaths | Civilian Injuries |
|---|---|---|---|
| Abandoning or carelessly discarding | 24,500(76.9%) | 568(63.0%) | 1,865(64.9%) |
| Falling asleep | 3,100 (9.7%) | 224(24.9%) | 654(22.7%) |
| Incendiary or suspicious causes | 1,000 (3.1%) | 0 (0.0%) | 75 (2.7%) |
| Unclassified misuse of smoking material | 600 (1.6%) | 30 (3.3%) | 48 (1.7%) |
| Becoming unconscious due to drugs or alcohol, or mishandling due to mental or physical impairment | 300 (1.1%) | 30 (3.3%) | 67 (2.4%) |
| Child playing (with smoking material or item it ignited) | 400 (1.0%) | 6 (0.7%) | 40 (1.4%) |
| Other known | 2,000 (6.6%) | 44 (4.7%) | 127 (4.4%) |
| Total | 31,900(100.0%) | 902(100.0%) | 2,876(100.0%) |

*All direct property damage figures for residential fires are inflated by estimation problems related to the handling of the Oakland fire storm.

Source: 1991 NFIRS, NFPA Survey

Numbers of fires are expressed to the nearest hundred and civilian deaths and injuries to the nearest one. Totals may not equal sums due to rounding.

**Table A-7. Form of Material First Ignited in Smoking-Material Fires**

**Annual Average of 1987-91 Fires in Residential Structures**

**Unknowns Allocated**

| Form of Material First Ignited | Fires | Civilian Deaths | Civilian Injuries |
|---|---|---|---|
| Mattress or bedding | 12,100 (32.6%) | 372(29.5%) | 1,232(38.0%) |
| Upholstered furniture | 9,100 (24.5%) | 650(51.5%) | 1,217(37.5%) |
| Trash | 6,300 (16.9%) | 44 (3.5%) | 208 (6.4%) |
| Clothing not on a person | 1,100 (3.0%) | 8 (0.7%) | 84 (2.6%) |
| Floor coverings | 800 (2.2%) | 18 (1.4%) | 50 (1.5%) |
| Papers or magazines | 700 (2.0%) | 14 (1.1%) | 39 (1.2%) |
| Structural members | 700 (1.9%) | 12 (0.9%) | 36 (1.1%) |
| Other known item | 6,300(16.9%) | 143(11.4%) | 377(11.6%) |
| Total | 37,200 (100.0%) | 1,262(100.0%) | 3,243(100.0%) |

*All 1991 direct property damage figures for residential fires are inflated by estimation problems related to the handling of the Oakland fire storm.

Source: 1987-1991 NFIRS, NFPA Survey

Numbers of fires are expressed to the nearest hundred and civilian deaths and injuries to the nearest one, and direct property damage to the nearest million dollars. Totals may not equal sums due to rounding. Percentages are based on estimates before rounding, so percentages may be different even if estimates are the same.

**Table A-8. Type of Smoking Material in Smoking-Material Fires**

**1991 Fires in Residential Structures**

| Type of Smoking Material | Fires | Civilian Deaths | Civilian Injuries |
|---|---|---|---|
| Cigarette | 28,800 (90.3%) | 777 (86.1%) | 2,645 (92.0%) |
| Cigar | 200 (0.6%) | 0 (0.0%) | 25 (0.9%) |
| Pipe | 200 (0.6%) | 26 (2.8%) | 37 (1.3%) |
| Unclassified or unknown type of smoking material | 2,700 (8.5%) | 100 (11.0%) | 169 (5.9%) |
| Total | 31,900 (100.0%) | 902 (100.0%) | 2,876 (100.0%) |

*All 1991 direct property damage figures for residential fires are inflated by estimation problems related to the handling of the Oakland fire storm.

Source: 1991 NFIRS, NFPA Survey

Numbers of fires are expressed to the nearest hundred and civilian deaths and injuries to the nearest one. Totals may not equal sums due to rounding.

# Statement of

# Philip Morris USA

# before the

# Subcommittee on Commerce
# Consumer Protection and Competitiveness
# Committee on Energy and Commerce
# U.S. House of Representatives

## H.R. 3885, "The Fire Safe Cigarette Act of 1994"
## April 20, 1994

Philip Morris is aggressively pursuing research and product development geared toward reduced ignition propensity cigarettes. Formal research projects have been underway since at least the late 1970s. These efforts have been hindered through the years by two major problems: first, the lack of a test method for measuring cigarette ignition propensity; and second, design modifications which are likely to reduce ignition propensity also tend to increase deliveries of tar, nicotine, and other constituents of tobacco smoke. These increases in delivery would be contrary to years of product development efforts to reduce deliveries. This is not what public health officials want and it is not what consumers want. The goal, then, is to improve "ignition propensity" in some meaningful sense without adversely affecting deliveries. In addition, any product with an improved "ignition propensity" would also need to be subjectively acceptable to smokers.

The first objective in product development was to attempt to develop some reproducible evaluation procedure to measure "ignition propensity." Efforts at Philip Morris in the early to mid-1980s focused on trying to increase the cigarette's "time to ignition" on a specific furniture mockup. Longer times to ignition would not necessarily mean a reduced propensity to ignite furniture, but it was hoped to be a step in the right direction. This approach was also more likely to result in a commercially feasible product than efforts to make a cigarette that self extinguishes. Over the years, this time-to-ignition mockup test was modified until the late 1980s when the test measured the length of time it took a cigarette to burn through a cotton thread. This test was not the reliable predictor of performance on real upholstered furniture that was needed, but it was thought to give some insights into cigarette design changes that would improve ignition propensity.

This research project was originally called the Ignition Propensity Study or IPS, and later referred to as Project Hamlet.

Hundreds of prototypes with hundreds of design modifications were considered under this project but none was both reduced in ignition propensity and commercially acceptable, including subjective acceptability and acceptable yields. The problems of delivery and taste could not be overcome. This research did not find the answer, but it did provide important knowledge for later research. The design parameters found to have a potential impact on ignition propensity were made available to other interested researchers. The TSG experimental cigarettes, for example, incorporated the design variables found by Philip Morris to have some effect on time to ignition.

The major problem in ignition propensity research is the fact that there is no standard, reliable test method to measure the ignition propensity of cigarettes on real upholstered furniture. The concept of "time to ignition" was not intended to be a reliable indicator of ignition propensity and has not been accepted by NIST or others as such. More recent research has focused on other approaches to potential test methods. The NIST test method, for example, adopts a completely different approach. Philip Morris has several concerns about using that test for regulation.

First, the NIST mockup test uses cotton fabrics called "Ducks." These fabrics are not used in upholstered furniture. They are more commonly used in army tents and backpacks. Their weave, density and chemical makeup differ from fabric normally used in upholstered furniture and, most importantly, duck fabrics do not behave the same as upholstery fabrics in ignition testing. Industry studies testing experimental cigarettes on real upholstery fabrics have reached different results from the NIST tests on ducks.

Second, the NIST test has not been related to environmental conditions in the home. Such important factors as air movement and humidity, which vary widely in real fire scenarios, dramatically affect the ignition equation. Because the NIST test eliminates these variations from consideration, it cannot predict the performance of cigarettes in real-world situations.

Third, there are problems with the NIST test's reproducibility. The margin of error in NIST tests is as much as 40%, meaning that a cigarette that ignites the duck fabric 50% of the time in one experiment may ignite it anywhere from 10% to 90% in another. This diminishes the value of the NIST test because its results are not reproducible.

This is not to say that no test method can be developed. Substantial research has been conducted by the industry Joint Venture and CORESTA Task Force. The results of these projects have been published or otherwise made available to interested researchers, including NIST and CPSC. We believe these projects provide valuable information toward developing a valid test and that further work should build on them.

Claims have been made recently that one Philip Morris brand, Virginia Slims Super Slims, is less ignition prone based on the NIST test. This cigarette was not developed in an effort to reduce ignition propensity, it does not perform better than other cigarettes on tests using real upholstery fabric, and should not be represented to the public as fire safe. This is an example of misleading conclusions that can be drawn by relying on an inappropriate test.

In a program aired on March 27, 1994, proprietary research documents were shown on CBS' television show "60 Minutes." It is unfair and misleading to select specific sentences, or in some cases sentence fragments or even single words, from a collection of research documents and suggest that those excerpts represent the final conclusion of a research project. It should also be kept in mind that the documents shown on the "60 Minutes" program came from a collection of over 14,000 pages of documents produced in a single case in New Jersey. The case was ultimately dismissed because plaintiff was unable to come forward with expert testimony that a "fire-safe" cigarette could be made.

The first document shown was a draft memo dated January 6, 1977, regarding a "self-extinguishing cigarette." This memo was written by a scientist at Philip Morris who was considering the issue for the first time. After reviewing existing files on the subject, he concluded that development of a self-extinguishing cigarette "does not appear to be an impossible task." This was the language highlighted on the screen by "60 Minutes." The author proposed a review of old data on these prototypes to identify a "common thread" that might be used to develop such a product. That "common thread" turned out to be non-porous paper, which invariably raises deliveries. This problem was discovered early in the research program and has been one of the major obstacles in product development in this area.

Another document used in the "60 Minutes" story was written ten years later, in 1987. This memorandum discusses the results of a preliminary subjective analysis comparing a control cigarette, which "60 Minutes" incorrectly referred to as a Marlboro, with a "Hamlet cigarette." The test cigarette described in this memorandum incorporated a very low porosity paper and a modified blend. Prior studies had shown that reducing porosity caused subjective problems and increased deliveries, especially of gas-phase components of smoke. One of the efforts to improve the acceptability of cigarettes with a non-porous paper was the use of modified blends. The test cigarette described in this memorandum was made with such a modified blend to see whether it improved the overall acceptability of the test cigarette. This cigarette was not self extinguishing or fire safe.

The cigarette was "panel tested" by 77 R&D personnel at Philip Morris. Each was given only two control and two experimental cigarettes and asked to compare them on several attributes. With only 77 participants, the test was not designed for statistical analysis. It was designed to see what people thought of the modified blend in the test cigarette. Both cigarettes in this test delivered approximately 16 mg of tar which makes them full-flavor cigarettes. Among the full-flavor smokers in this panel the test cigarette was rated low in acceptability compared to the control.

Another problem with the test cigarette is the fact that it had very high deliveries, particularly of gas-phase smoke components, on both a per-cigarette basis and per-puff basis. This is a significant problem that could not be corrected without increasing the porosity of the paper and losing any ignition propensity benefit. Research continued, however, to build on knowledge developed in this and other tests.

In short, the test cigarette described in this memo is not reduced in ignition propensity and is not acceptable as a commercial product.

After over a decade of research in this area, Philip Morris has not been able to overcome the difficulties of realistically reducing ignition propensity and obtaining acceptable deliveries and subjective taste. Current research and product development efforts utilize knowledge developed in the TSG, CORESTA and Joint Venture research projects. This is one of the largest research projects ongoing at Philip Morris. Again, progress is difficult to measure without a reliable test method upon which to base conclusions about real-world ignition propensity. While we currently have ideas we hope will lead to meaningful reductions in ignition propensity, we do not yet have anything we can market. Philip Morris looks forward to continued cooperation with Congressman Moakley, NIST, CPSC and other agencies or organizations interested in establishing an appropriate test for measuring the true ignition propensity of cigarettes.

# Statement of R. J. Reynolds Tobacco Company

R. J. Reynolds Tobacco Company welcomes this opportunity to comment on H.R. 3885. Our company is keenly interested in the subject of fire safety, especially with regard to the careless handling of our products. For many years, we have conducted research directed toward the development of cigarettes with a reduced ignition propensity. That research has been based not only on the ideas of our own scientists and product developers, but, in addition, we have searched the patent literature and evaluated the ideas of other inventors and we have worked with our suppliers to elicit and test their ideas. Despite our continuing efforts, we have not successfully developed a cigarette that consumers find acceptable and that is less likely to start fires in real-world situations if carelessly handled. There are two reasons for our lack of success:

1. The modifications to cigarettes to make them less likely to ignite other materials also make those cigarettes unacceptable to smokers.

2. Our product development is hampered by the lack of a test method that can predict what will happen if a cigarette is dropped on actual home furnishings in real-world circumstances.

Reynolds Tobacco does not endorse H.R. 3885 because it is based on assumptions contrary to what we know to be true. First, underlying this bill is an assumption that we have the ability to make less ignition prone cigarettes that smokers will buy and enjoy. Second, this bill implicitly relies on the assumption that a test method exists that predicts the likely outcome if a cigarette is carelessly handled. Passing H.R. 3885 will not make those assumptions true.

In this statement, Reynolds Tobacco takes the opportunity to review for this Subcommittee our efforts to develop a less ignition prone cigarette. Although we are aware that others providing statements on behalf of The Tobacco Institute and its member companies will address deficiencies in the test method proposed by the National Institute of Standards and

Technology ("NIST"), the recent history of our product development efforts also includes research that demonstrates that the NIST test is woefully inadequate as a basis for a cigarette fire safety standard aimed at reducing actual fires.

Before describing our efforts to date, we assure the Subcommittee that our efforts to develop a consumer acceptable lower ignition propensity cigarette have not ended. Our work so far, though, has demonstrated the complexity of this problem. And that problem is compounded by the lack of a test method with real-world predictive capabilities. We will continue to work on both cigarette and test method development, and we would welcome the opportunity to pursue those objectives with Congressman Moakley, the Subcommittee, and the Consumer Product Safety Commission.

Reynolds Tobacco has worked for decades to develop low ignition propensity cigarettes. Early efforts focused on cigarettes with fire stops or other design characteristics that caused the cigarette to "self-extinguish." Consumers, however, demand products that do not have to be continuously re-lighted. Moreover, it also became apparent that just because a cigarette would extinguish within a certain period of time did not mean that it would not ignite other combustible material before extinguishing itself.

We also conducted extensive patent reviews and evaluated the feasibility of inventions described in dozens of patents. Many, if not most, of these patents describe outlandish and unworkable ideas. Inventors, for example, have proposed encasing cigarettes in everything from clay to milk solids to asbestos. Over the years, we have also worked with our suppliers, especially paper suppliers, to determine what products, if any, might be available to affect ignition propensity, yet retain consumer acceptance. Those efforts have not proven fruitful.

In the 1980's, Reynolds Tobacco undertook extensive development work on a new cigarette that was test marketed in 1988 as Premier. Premier was developed at considerable expense to the company to provide tobacco taste and smoking pleasure; to simplify the smoke chemistry and reduce or eliminate many of the compounds in cigarette smoke involved in the controversy over smoking; to minimize the potential for biological activity as measured by toxicological assays and tests widely used to study cigarettes and cigarette smoke; and to reduce or eliminate environmental tobacco smoke. It also proved to be essentially "fire-safe." That is, Premier, which heated but did not burn tobacco, was unlikely to ignite most combustible materials when lit and lying flat. Premier was denounced by anti-tobacco advocates, and was a failure in test market. It is a clear example of a cigarette displaying reduced ignition propensity characteristics that was not accepted by the consumer.

Premier technology which contributed to its reduced ignition propensity characteristics is not transferable to cigarettes currently on the market. Premier did not burn tobacco; all that burned was the heat source in the tip of the cigarette. The heat source was contained within an insulating jacket. The insulation was the key feature of Premier which reduced its ignition propensity. That feature was not and is not applicable to tobacco-burning cigarettes.

In the meantime, Reynolds Tobacco was actively participating in the Technical Study Group on Cigarette and Little Cigar Fire Safety (TSG), created in 1984 by federal legislation. The TSG, relying on research conducted by the National Bureau of Standards (NBS), used a mockup test and experimental cigarettes having extreme design characteristics to study the ignition behavior of such cigarettes. Based on that laboratory work, the TSG identified four cigarette construction parameters (reduced circumference, lower tobacco density, less porous paper and, in some cases, reduction of citrate addition to the paper) that, when taken to the extreme, were thought to affect the ignition propensity of cigarettes. The TSG concluded that these construction parameters were most effective in reducing ignition propensity in combination

Upon completion of the TSG work in 1987, Reynolds Tobacco directed its low ignition propensity product development efforts to focus on the construction parameters identified by the TSG. A series of consumer tests was begun to determine the acceptability to smokers of cigarettes made using those construction parameters. All consumer test methodologies used to evaluate these "lower ignition propensity" prototypes were identical to those used by Reynolds Tobacco for other new or modified cigarette products.

The first large test involved 1500 smokers from a wide geographical area (100 smokers in each of 15 cities) who were asked to evaluate two unidentified test cigarettes and an unidentified control cigarette in random fashion. The study was a Central Location Test, one in which recruited smokers go to a market research facility to try the test products. All persons recruited for the test were regular smokers of the particular type of cigarette to be evaluated.

The test cigarettes for this study incorporated the extreme value of two of the variables identified by the TSG: expanded tobacco content and paper permeability. Both circumference values, 21 and 25 mm, of the TSG cigarettes also were tested. The control cigarette represented Reynolds Tobacco's best-selling product. Although the TSG had studied only cigarettes made with either all flue-cured or all burley tobacco, this variable was not determined to be statistically significant. All cigarettes we tested were made with blended tobaccos, as used in all U.S. cigarette brands.

Two formats were used to present the cigarettes to the smokers. In the first, the smokers individually tried the two test products and the control, with information provided to them about the "benefit" of the product. They were told that the cigarettes may be less likely to ignite upholstered furniture if accidentally dropped or discarded. In the second, the smokers individually tried the 21 mm test cigarette and the control, but with no information provided. Somewhat surprisingly, though the products tested in these two formats were identical, those tested with the concept of "fire safety" known, including the control, were rated lower than those tested without the concept.

In both formats, however, the test cigarettes were rated significantly deficient to the control in terms of overall acceptance, specific taste characteristics (such as strength, harshness, mildness, tobacco taste, and aftertaste), and specific attributes related to appearance and aroma (such as flaky or flyaway ash, uneven or unusual burning appearance, and unusual burning aroma). Negative comments were also made because the test cigarettes tended to go out before the smokers extinguished them.

After the highly unfavorable response of consumers in the Central Location Test of the extreme TSG parameters, we designed studies to test modifications of the TSG parameters for their effect on ignition propensity and consumer acceptance. We conducted several in-home tests which permit more thorough evaluation of products. Each in-home test involved 300 to 850 smokers per test cigarette. Smokers were sent two packs of unidentified cigarettes for use and evaluation. In one extensive test, four test products and a control cigarette were evaluated. In the test cigarettes, expanded tobacco content ranged from 25 to 100%, and paper permeability was 5 cm/min (for 25, 50, or 100% expanded tobacco levels) or 15 cm/min (for 75% expanded tobacco). Circumference was nominally 25 mm and no citrate was used on the cigarette papers.

The non-expanded tobacco portions of the blends were cased and top-dressed with the same materials as in normal commercial blends.

These prototypes were tested for ignition propensity using the NBS mockup test. The 100% expanded tobacco cigarette with 5 cm/min paper was considered the "benchmark" for the test because it incorporated the extreme values of the two most significant TSG variables. Based upon strict adherence to the TSG ignition propensity variables, this cigarette should have shown the lowest ignition propensity of the five cigarettes tested (by the mockup test used by NBS for its TSG work). It did not, however, and this is an indication of the inherent variability of that test method, the only one available at the time. The cigarette with 50% expanded tobacco and 5 cm/min paper showed the lowest ignition propensity by the NBS mockup test with 10% ignitions. It was followed by the 100% expanded tobacco/5 cm/min paper cigarette (17% ignitions), the 25% expanded tobacco/ 5 cm/min paper cigarette (33% ignitions), the 75% expanded tobacco/15 cm/min cigarette (76% ignitions), and the control (100% ignitions).

Smokers evaluated their overall acceptance of the cigarettes, rated specific taste attributes, and commented on particular properties of the cigarettes that they liked or disliked. The design of the test, the ballot to rate the cigarette, and the call-back response were all done in the same manner as other in-home tests conducted by Reynolds Tobacco for evaluation of new or modified cigarette products.

Overall, the 100% expanded tobacco cigarette received the lowest consumer acceptance rating. Next were the 25 and 50% expanded tobacco cigarettes with 5 cm/min paper, followed by the 75% expanded tobacco cigarette with 15 cm/min paper. All four test cigarettes were rated significantly lower than the control. Although the "intermediate" prototypes offered small improvements over the "benchmark" TSG-like prototype, all prototypes were clearly unacceptable relative to the control, with a number of identified product deficiencies, including more harshness, less smoothness, various negative taste characteristics, and unpleasant aroma. The prototypes that showed significant reductions in ignition propensity by the mockup test also elicited significant negative consumer comments relating to cigarettes going out, flaky ash, unusual burning appearance, unusual burning aroma, and unusual or different taste. The majority of those who evaluated these products noted most of these negative characteristics. These negative characteristics identified by consumers were even more pronounced in this extended use in-home test of the products than in the one-cigarette evaluations of the Central Location Test.

Another evaluation of prototypes using the TSG variables involved a screening study of 22 test cigarettes made with a range of expanded tobacco levels, cigarette papers, paper citrate levels, and modifications to the cigarette filters. The cigarettes were evaluated for ignition propensity, smoke yields, and visual appearance. The four best candidates were selected for consumer testing.

Three hundred smokers tested each of the four products (1200 smokers total). Although one of the "intermediate" prototypes was closer to the control in terms of measured smoke yields, puff count, and burning appearance than any of the previously tested prototypes and offered modest improvements in acceptance over the "benchmark" prototype, it was still rated by smokers as significantly inferior to the control product. The other three prototypes in this study were also significantly deficient in overall acceptance and in specific taste and appearance attributes.

Despite the product design modifications incorporated to make the prototypes more like the control in smoke delivery characteristics and burning appearance, the prototypes were significantly inferior to the control due to too little tobacco taste, too much harshness, and negative taste, aftertaste and aroma characteristics. All were also deficient relative to the control for the unique characteristics previously associated with reduced ignition propensity prototypes, such as unusual burning appearance and aroma, and the tendency to go out during smoking.

Although the TSG Final Report concluded that reduced ignition propensity cigarettes are "technically feasible, and may be commercially feasible," Reynolds Tobacco research indicates that incorporation of the TSG variables, at levels sufficient to show reduced ignition propensity as measured by the NBS mockup test, does not result in products acceptable to smokers. The combination and extent of cigarette construction parameters identified by the TSG that must be used to result in potential reduced ignition propensity alter a number of physical properties of the burning cigarette in a negative fashion and impart negative taste and burning characteristics that are unacceptable to smokers. Even with conventional product modifications to improve specific product attributes and "intermediate" levels of the TSG variables, the TSG-like products were significantly inferior to the control cigarettes.

Following the failure to achieve consumer acceptability by varying the TSG parameters, Reynolds Tobacco determined to investigate the behavior of those characteristics more systematically. The TSG had not studied those parameters individually. We made a series of cigarettes in which the only parameter varied was circumference; the other properties including packing density, tobacco blend, paper permeability, and citrate, were held constant and within the range of commercially popular cigarettes. Circumferences were 21.0, 22.5, 25.0 and 27.0 mm, which provided an intermediate value and exceeded the high end of the range tested by TSG. The NBS ignition propensity test, with three mockup configurations, was not able to discriminate among the cigarettes. Three other approaches to ignition testing, two primary and one secondary (indirect), were also used. Each test included two "indicator" cigarettes made with extreme construction parameters to show that the methods could discriminate among cigarettes; and they could. The TSG had reported that small circumference cigarettes reduced the likelihood of ignition, and the three methods that could discriminate among these test cigarettes also showed statistically significant differences among the test cigarettes. The direction, however, of the differences was opposite to that reported by the TSG. It was concluded from this research that small circumference alone does not reduce the likelihood of ignition, and larger circumference alone does not increase the likelihood of ignition. These surprising results indicated not only the complexity of ignition behavior, but also that there were major areas of the TSG work, including reliability of the NBS test method, that were open to question.

Recently, Reynolds Tobacco has researched construction and design parameters not identified by the TSG. These efforts have also failed to produce prototypes that consumers will accept.

Our research has confirmed that several non-cigarette variables can play dominant roles in influencing ignition propensity. The variables fall into two major categories which have been shown to substantially affect the outcome of ignition behavior in testing: test materials (substrates/fabrics) and test environment (conditions).

The Fire Safe Cigarette Act of 1990 required NIST to complete the development of a standard test method to determine ignition propensity. The test that NIST has proposed is overly simplistic because it does not take into consideration the range of furnishings and environmental conditions in the real world, and it does not even provide consistent results from lab to lab.

A laboratory test, above all, must be capable of predicting what will happen in the real world if cigarettes are carelessly handled or dropped on upholstered furniture. The present NIST test does not make that connection, nor does it give any assurance that a cigarette that "passes" the test will be less prone to start a fire in the real world.

NIST's approach to test method development was to seek an ignition test that would correlate to, that is, repeat as closely as possible, the results of its earlier work for the TSG. Tobacco industry researchers presented results of their research from the intervening years between the two enabling acts (1988 through 1990) to NIST. Yet, despite the serious issues raised about the earlier TSG work due to findings regarding the influence of substrates and environment, NIST persisted in its narrow approach.

Industry research, both ongoing and that shared with NIST throughout the course of its work under the 1990 Act, continues to show that the ranking of cigarettes according to ignition propensity is primarily dependent upon the substrate tested. The conditions under which the test is run also influence the test outcome. The ranking of cigarettes produced by the NBS/NIST tests is not an absolute ranking--it is just one ranking. And there is a great deal of data to suggest that it may well be a misleading one.

In addition to conducting tests of our own, Reynolds Tobacco contracted with Battelle Laboratories to conduct ignition propensity studies and to determine the effect of air flow on ignition behavior.

Battelle, a highly respected independent laboratory, designed equipment and chambers to carefully control air flow and tested a subset of the TSG cigarettes that incorporated a variety of the construction characteristics of interest. Battelle's work resulted in several important findings.

First, under certain conditions, "low" ignition propensity cigarettes (as defined by the TSG) showed higher ignition propensity than the so-called "high" ignition propensity cigarettes. Second, a given type of cigarette could reverse its ignition propensity over a range of air flows and "pairs" of cigarettes could reverse their relative ignition propensities. Finally, the smoldering ignition of substrates is an exceedingly complex phenomenon and the relative ignition propensity of various cigarettes is dependent on both the substrate and environmental conditons such as air flow. Battelle concluded that in order to assess the relative ignition propensity of various cigarette types, it would appear that a test should include a range of substrates with varying ignitabilities tested under various environmental conditions.

The present NIST test method uses only cotton duck fabrics, which are not representative of upholstery fabrics commonly in use, in an enclosure that is designed to eliminate any effects of air flow. Evidence presented to NIST based on research conducted by the tobacco industry demonstrates that the majority of actual upholstery fabrics do not exhibit the same results predicted by the NIST test method.

The test method proposed by NIST for measuring cigarette ignition propensity has little relevance to a cigarette's ignition potential under realistic circumstances. The effects of air flow and the nonrepresentative characteristics of cotton duck fabrics are two factors that raise serious questions about the validity and reliability of the proposed NIST test method.

There is, however, a much more significant problem with the NIST test method as a basis for a performance standard. Cigarettes which "fail" the NIST test might actually be less ignition prone on commonly-used upholstery fabrics and under conditions more likely to prevail in actual home situations than accounted for by the NIST test methodology. The result would be that the standard based on such a test could serve to deprive consumers of a product offering an ignition propensity benefit.

More important, cigarettes which "pass" the test may instead be more ignition prone in more prevalent realistic circumstances. This result is much more disturbing: cigarettes manufactured and sold pursuant to a federal standard for ignition propensity might put consumers who carelessly handle them at greater risk.

To date no test methodology exists to accurately measure/determine ignition propensity of cigarettes under a range of real-world conditions and fabrics actually used in upholstered furnishings. Without a reliable test method, our product development continues to be hampered, because ignition performance and consumer acceptance are both vital to reduced ignition propensity products that will, in fact, affect the incidence of fires related to carelessly handled cigarettes. Consumers must be willing to smoke them. And we must have reliable ignition propensity results. Reynolds Tobacco has been diligent, albeit unsuccessful, in attempting to surmount problems in cigarette design that arise from achieving reductions according to the NBS or NIST tests. Given the severe limitations of these tests there can be no confidence that even if consumers would accept prototypes which display "reduced ignition propensity" based on these tests, that they are in fact less ignition prone. No responsible manufacturer of consumer products would place in the market a product with claimed features that could not be documented by a reliable test.

RJReynolds
Tobacco Company

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May 23, 1994

The Honorable Cardiss Collins
House Subcommittee on Commerce,
 Consumer Protection and Competitiveness
House Annex #2, H 2-151
Washington, DC 20515

Dear Representative Collins:

I received a "carbon copy" of the faxmail transmission containing questions for the record of the hearing that was addressed to Dr. David E. Townsend from Mr. Richard Huberman.

It is understandable that you would want to know some specific details surrounding the discussions that took place in June, 1993 and in April, 1994. In the June 1993 conversation, the question about confidence in the findings was raised by Dr. Townsend within the context of the discussion of CPSC's field study. We have been forthcoming in this matter and are willing to continue to do so.

The information in my April 26, 1994 letter was intended to supplement the official record of the hearing on H.R. 3885 held on April 20, 1994 and provided information on the issues raised at that time. The information provided in that letter is the most that I am in a position to provide at this time. Dr. Townsend is also out of the office until late in the month.

Sincerely,

Reba Hayes Warren

Reba Hayes Warren

RHW/se

"We work for smokers."

ONE HUNDRED THIRD CONGRESS

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**U.S. House of Representatives**
**Committee on Energy and Commerce**

SUBCOMMITTEE ON COMMERCE,
CONSUMER PROTECTION, AND COMPETITIVENESS

**Washington, DC** 20515–6120

April 28, 1994

Dr. David E. Townsend
Principal Scientist, Research and Development
R.J. Reynolds Tobacco Company
Bowman Gray Technical Center
Winston-Salem, NC 27102

Dear Dr. Townsend:

Thank you for testifying at the Subcommittee's recent hearing on H.R. 3885, the Fire Safe Cigarette Act of 1994. Following are questions for the record of the hearing. Please respond and return to the Subcommittee within five business days.

(1) In CPSC Chairman Brown's testimony, she indicated that in June 1993, a representative of one of the cigarette companies asked a member of the CPSC staff how the Commission would react if the company were to unilaterally make certain changes in its product to reduce ignition propensity. She also testified that a company had contacted her in recent days and requested an opportunity to talk with the Commission about voluntary options on the fire-safe cigarette issue.

In the subsequent testimony of Congressman Whitley of the Tobacco Institute, he indicated that you were the individual who had made the contact regarding a unilateral action by one company. Congressman Whitley indicated that it might be appropriate for you to describe the contact. While you did not have the opportunity to do so at the hearing, a brief description of the contact appears in the letter of April 26, 1994, from Reba Hayes Warren, Assistant Counsel, Research and Development, R.J. Reynolds Tobacco Company, submitted for the record of the hearing. Please provide for the record a complete description of your contacts with the Commission referred to in Chairman Brown's testimony, including any contacts related to voluntary options on the fire-safe cigarette issue.

(2) In the April 26 letter from Reba Hayes Warren, mention is made of "voluntary actions to address fire safety issues" and "a number of voluntary options". Please provide a detailed description of the voluntary actions or voluntary options R.J. Reynolds Tobacco Company contemplates or is considering.

Thank you for your cooperation.

Sincerely,
Cardiss Collins
CARDISS COLLINS
Chairwoman

CC:rh

RJReynolds

REBA HAYES WARREN
Assistant Counsel
Research and Development

Winston-Salem, NC 27102
Telephone: (910) 741-4473
Facsimile: (910) 741-3763

April 26, 1994

The Honorable Cardiss Collins
House Subcommittee on Commerce,
Consumer Protection and Competitiveness
House Annex #2, H2-151
Washington, DC 20515

Dear Representative Collins:

In her testimony at the April 20, 1994 hearing on H.R. 3885, CPSC Chairwoman Brown indicated that conversations between her staff and a representative of a tobacco company indicated that the company in question had developed a commercially feasible "fire-safe" cigarette. This was a mischaracterization and a misinterpretation of both the objective and the content of conversations between CPSC staff and R. J. Reynolds Tobacco Company.

In June 1993, Dr. David Townsend, Principal Scientist at Reynolds Tobacco, met with CPSC staff to discuss results of the Industry Fabric Survey which called into question the meaningfulness of the NIST ignition propensity tests. At the close of that meeting, Dr. Townsend asked the staff whether CPSC accepted the findings of the agency's field study on cigarettes involved in the ignition of fires. Reynolds Tobacco was interested in the field study because it was the only attempt in work under the Fire Safe Cigarette Act of 1990 to identify the cigarette design characteristics that were associated with actual, real-world fires as opposed to the ignitions from artificial laboratory tests. If CPSC staff had confidence in the field-study findings, Dr. Townsend indicated that those findings might constitute the basis for voluntary steps that Reynolds Tobacco might be willing to take provided that they led to consumer acceptable products.

The reaction from the CPSC as to the validity of the field-study findings appeared to be mixed. As a result, no other discussions of the field study results took place between Reynolds Tobacco and CPSC until early in April of 1994. At that time, a former CPSC staff member who was present at the June meeting called Dr. Townsend to make him aware that the discussions at the June 1993 meeting would be presented by Chairwoman Brown at the hearings on H.R. 3885 as evidence that Reynolds Tobacco knows how to make a commercially feasible "fire-safe" cigarette. At that point, and in subsequent conversations up to April 15, 1994, Dr. Townsend attempted to correct CPSC's misunderstanding of the intent of the June conversations, but he was unsuccessful.

Reynolds Tobacco does not know how to make a "fire-safe" cigarette that is consumer acceptable. It is unfortunate that CPSC has misinterpreted Reynolds Tobacco's contacts with CPSC as evidence of commercial feasibility. This set of events does not foster an environment of good will that could lead to voluntary actions to address fire safety issues. Reynolds Tobacco remains optimistic, however, that a number of voluntary options can be discussed with CPSC in a reasonable, productive manner.

There is sound scientific evidence that the test developed by NIST to measure cigarette ignition propensity is not relevant in "real-world" circumstances. Specifically, the ignition behavior of the substrates used by NIST does not predict the ignition behavior of the majority of upholstery fabrics available to consumers. Through the Industry Joint Venture, a study was conducted using TSG cigarettes (experimental cigarettes with extreme design parameters and used by NIST in its test method development) and actual upholstery fabrics.

Five-hundred (500) upholstery fabrics were purchased at retail and were screened for their ignitability by cigarettes using a TSG cigarette with the extreme design parameters cited by the TSG as contributing to "high" ignition propensity (Figure 1). Through this screening, 145 of the 500 fabrics were determined to be ignitable. Additional ignition testing was conducted on these ignitable fabrics using four different TSG cigarettes which spanned the range of ignitability as measured by the NIST tests, both in the TSG work under the Cigarette Safety Act of 1984 and in studies conducted pursuant to the 1990 Act. Figure 1 shows the results of these upholstery fabric tests, and clearly, the majority of the fabrics show results quite different from those predicted by the NIST results. Approximately 44% of the ignitable fabrics could not distinguish among the TSG cigarettes. The behavior of those cigarettes believed to be "low" ignition propensity by the NIST test was the same as that of cigarettes deemed "high" ignition propensity by the NIST test. An additional 41% of the fabrics did discriminate in some fashion among the four TSG cigarettes, but not in the order predicted by the NIST test. In some cases, the fabric ignition behavior was the opposite of that predicted by NIST, that is, the "low" ignition propensity cigarettes were more likely to ignite the fabrics than those cigarettes the NIST test designated as "high" ignition propensity. With only 21 fabrics, or 14.5% of those that were ignitable, did the results of the NIST test predict the ignition behavior of the fabrics. As far as is known, these results represent the largest survey of the ignition behavior of actual upholstery fabrics that has ever been reported. The Industry Joint Venture is continuing its study of upholstery fabrics, and is in the process of evaluating the ignition behavior of an even larger sample of ignitable fabrics. Results of the additional fabric evaluations to date are consistent with these conclusions, and NIST is incorrect in concluding that the former study is "invalid".

There is also additional evidence that the NIST test is not meaningful in its assessment of cigarette ignition propensity. As a result of its work under the 1990 Act, NIST claims to have identified 5 cigarettes currently on the market that exhibit reduced ignition propensity (as compared to 14 best-selling cigarette brands, which all showed 100% or nearly 100% ignitions, Figure 2). During the course of identification of ignitable fabrics for the current upholstery fabric study, an Industry lab tested the five "reduced ignition propensity" cigarettes and five of the 14 best-selling brands on the first 25 ignitable upholstery fabrics identified. The fabrics were not pre-selected; all that was known at the initiation of the study was that the fabrics were ignitable with a "high" ignition propensity TSG cigarette. In contrast to the results shown by the NIST test, the ignition behavior of the upholstery fabrics showed no difference among the cigarettes; the smaller circumference "reduced" ignition propensity cigarettes and the best-selling brands showed similar overall ignition behavior (Figure 3). The results were similar to those found in the 500 Fabric Survey, with some fabrics unable to discriminate among the cigarettes, some showing a NIST-like ranking, and in this case, an equal number showing the "reduced" ignition propensity cigarettes more likely to ignite the fabrics than the "high" ignition propensity best-selling brands. Again, clearly, the NIST test does not realistically predict the ignition behavior of upholstery fabrics.

Reynolds Tobacco has conducted several studies over the last six years in answer to charges that the U.S. fire death rate is higher than other western countries due to differences in cigarette construction. Ignition testing and analysis of cigarette properties has led to the conclusion that there are no differences in cigarettes to account for fire death rate differences among countries (Journal of Fire Sciences, Volume 8, 1990 and Proceedings of the International Conference on Fire Safety, Volume 18, 1993). Most recently, Reynolds Tobacco has tested two Hungarian cigarettes that account for 70% of the cigarette market in a country with a high fire death rate, and where 40% of fire deaths are attributed to careless smoking fires. These two cigarette brands are the only two out of over forty brands tested to date which show any reduction in ignition propensity, by either the NIST cotton duck test or the test used by NIST under the TSG work. The Hungarian cigarette brands showed ignition results by the NIST cotton duck test that were comparable to or better than the results reported by NIST for the five "reduced" ignition propensity U.S. commercial cigarettes. It is difficult to understand the meaningfulness of a test that shows reduced ignition behavior for the majority of the cigarettes sold in a country (Hungary) where careless smoking fires are more prevalent than they are in the United States.

The information contained in this letter responds to issues that were raised during the hearing on H.R. 3885 on April 20, 1994. I respectfully request that this letter and the accompanying charts be included in the official record of that hearing.

Sincerely,

Reba Hayes Warren

Reba Hayes Warren

RHW/se

cc: The Honorable Cliff Stearns
U.S. House of Representatives
331 Cannon House Office Building
Washington, D. C. 20515

FIGURE 1

500 FABRIC SURVEY

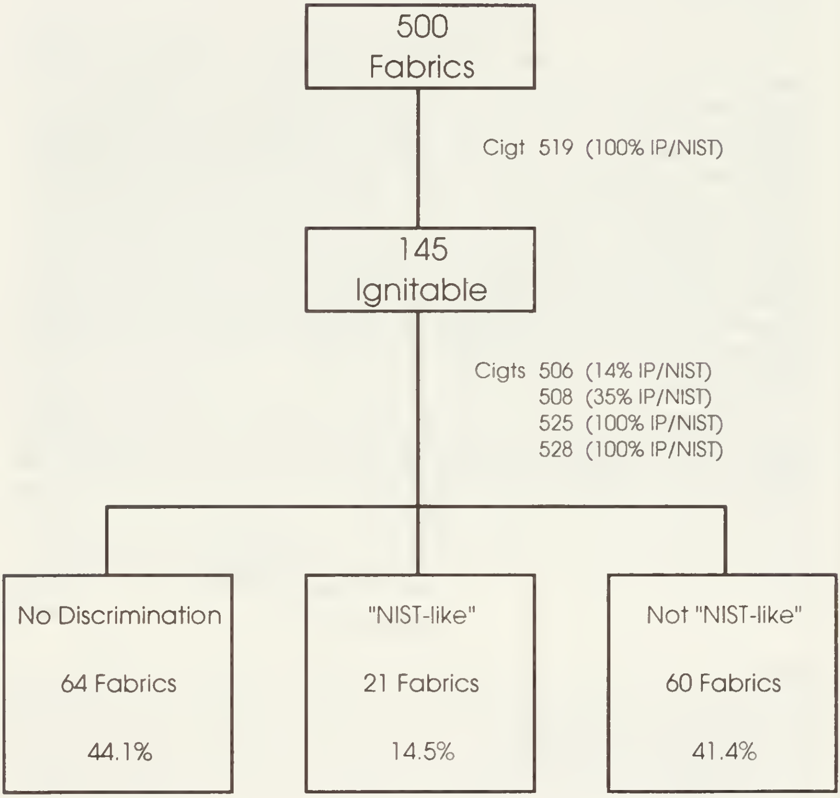


FIGURE 2

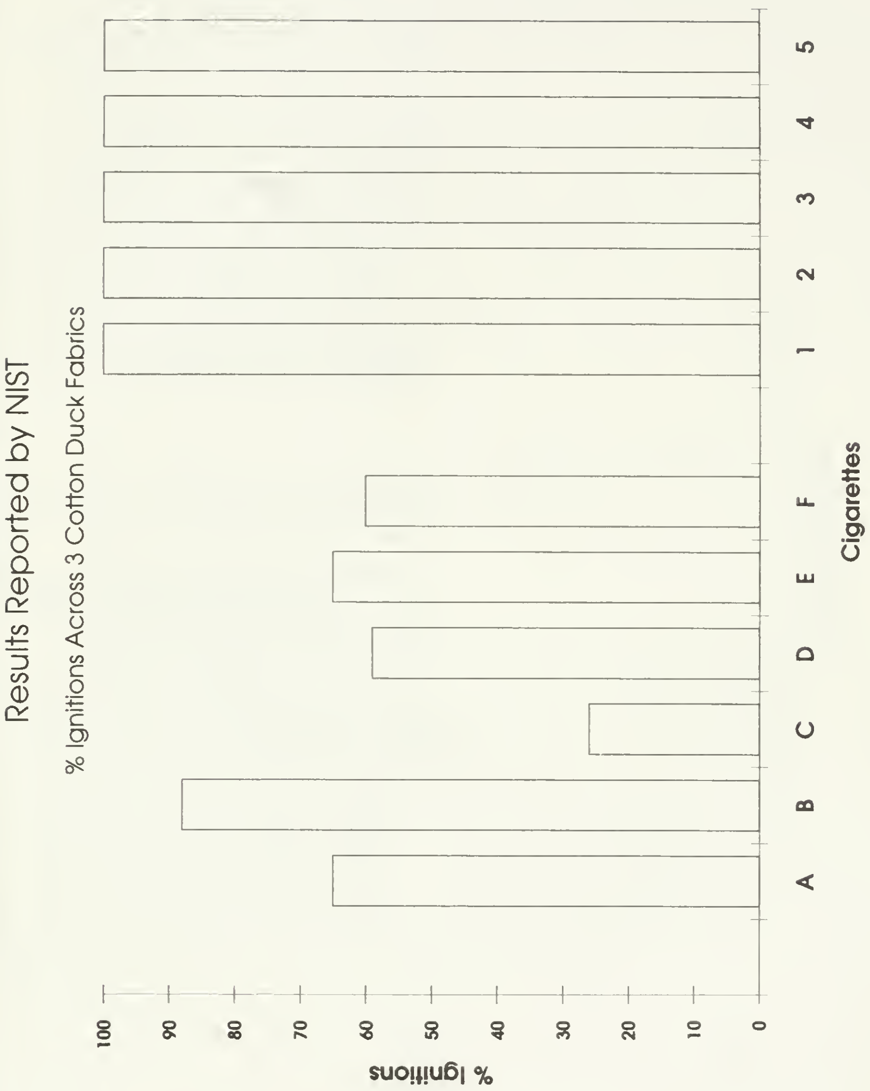
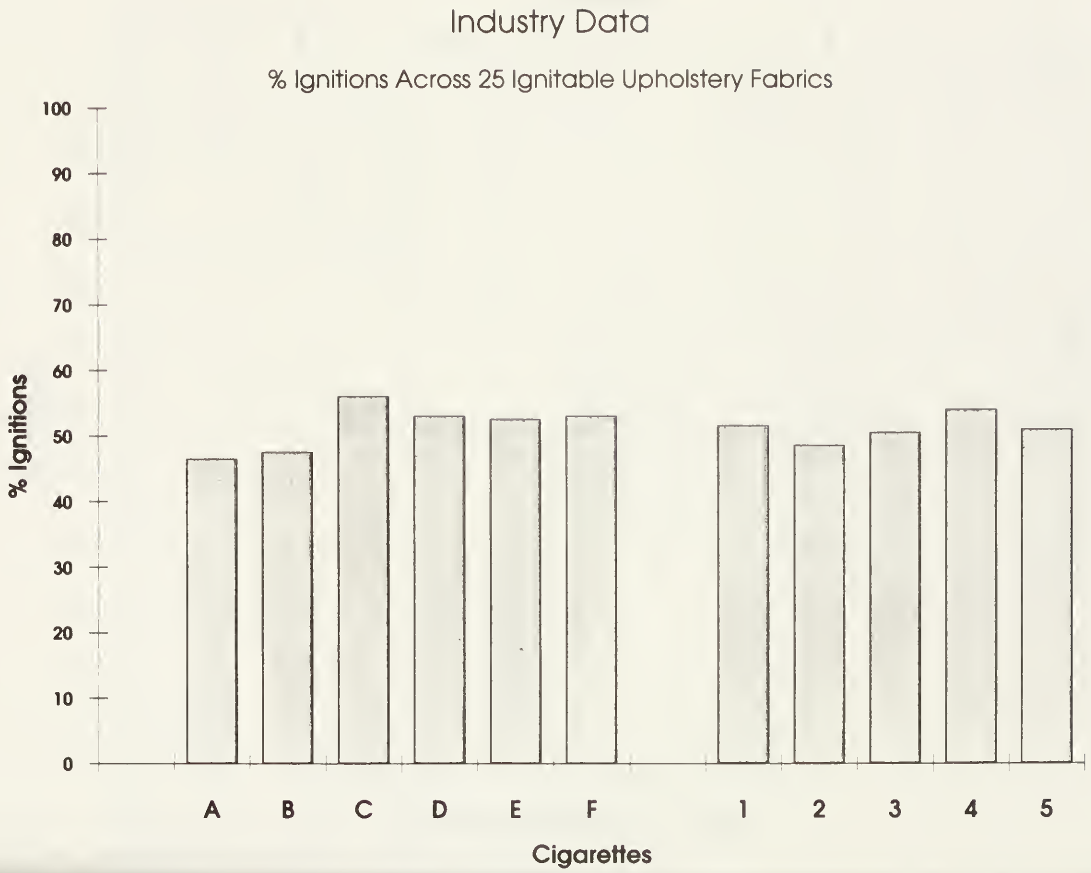

Results Reported by NIST
% Ignitions Across 3 Cotton Duck Fabrics
% Ignitions
100
90
80
70
60
50
40
30
20
10
0
A
B
C
D
E
F
1
2
3
4
5
Cigarettes

FIGURE 3


Industry Data
% Ignitions Across 25 Ignitable Upholstery Fabrics
% Ignitions
100
90
80
70
60
50
40
30
20
10
0
A
B
C
D
E
F
1
2
3
4
5
Cigarettes

# STATEMENT OF PHILIP SCHAENMAN
Before the Subcommittee on Commerce,
Consumer Protection and Competitiveness of the
Energy and Commerce Committee,
United States House of Representatives
on
H.R. 3885, "The Fire Safe Cigarette Act of 1994"

Madam Chairman, Members of the Subcommittee, my name is Philip Schaenman. I am president of TriData Corporation in Arlington, Virginia, a consulting firm that provides technical advice and statistical analyses on a wide range of fire protection issues. TriData's clients include federal agencies, local governments across the country, and many industries, including The Tobacco Institute.

I appreciate the opportunity to submit a statement on H.R. 3885, "The Fire Safe Cigarette Act of 1994."

## Fire Data Trends, 1980-1991

In 1980, while serving as Associate Administrator of the U.S. Fire Administration, I compiled statistics that Congress relied upon in authorizing federal studies dealing with cigarette fire safety. I have continued to monitor those statistics since becoming president of TriData. The attached TriData report, entitled "Trends in Smoking Materials Fires: 1993 Update," includes fire trends through 1991. The report was distributed to members of the Technical Advisory Group that oversaw the work completed under the Fire Safe Cigarette Act of 1990.

As the report shows, one of the most significant trends since 1980 has been a dramatic and sustained decline in the number of fires and fire deaths attributed to smoking materials. ("Smoking materials" fires, following the definition used by the National Fire Protection Association and the U.S. Fire Administration, include fires involving cigarettes, cigars, and pipes, but not matches or lighters. The data here refer to fires and fire deaths in structures, the location of almost all smoking materials-related fore deaths.) During the early 1980s, the number of smoking materials-related fire deaths exceeded 2,000 per year. That number declined by more than 50 percent over the last decade, to about 950 deaths per year for the last two years. The percentage would be higher if stated on a per capita basis, taking into account the growth of the population.

The decline in smoking materials-related fires and fire deaths is not due solely or even primarily to the decline in smoking rates. There has been a 41 percent drop in fire deaths per billion cigarettes from 1980-1991, which indicates that factors besides smoking rates accounted for most of the decline.

As these statistics show, the decline in smoking materials-related fires and fire deaths has been both rapid and continuing. The problem is now less than half of what it was when Congress first began to consider legislation in this area.

## Factors Contributing to Decline in Smoking-Materials Fires

A variety of factors have contributed to the remarkable decline in smoking-materials fires.

- In the late 1970s, smoke detectors were present in only about 20 percent of U.S. homes. A recent study by the Consumer Product Safety Commission (CPSC) estimates that 90 percent of all homes today have smoke detectors. Smoke detectors are perfectly suited to detect slow, smoldering fires before they become deadly.

- The installation of sprinklers in commercial and multi-family dwellings (including hotels) has sharply lowered fatalities in these buildings. Studies have shown that more than 90 percent of fire deaths from all causes can be eliminated through the use of sprinkler systems.

- Mattress flammability standards developed in the 1970s by the CPSC also have played a role and will become increasingly significant as outmoded, pre-standard mattresses are worn out and discarded.

- Improvements in the fire resistance of upholstered furniture also have contributed to the downward trend. This is particularly the case in California, where mandatory upholstered furniture flammability standards have resulted in upholstered furniture fires fire deaths that are more than 87 percent lower on a per-capita basis than they are in the rest of the nation.

- Finally, public fire safety education and prevention programs have made a major difference across the nation, including many inner-city areas where the fire problem is disproportionately high.

The downward trend in smoking-materials fires -- indeed, in all fires -- can be continued with further emphasis on existing practices and technologies. For example, despite the fact that smoke detectors are present in 90 percent of all homes, the CPSC recently found that almost one-third of the detectors that have been installed are not in working condition, often simply because the battery needs replacement. Moreover, the 10 percent of all homes that do not have smoke detectors tend to be concentrated in inner-city neighborhoods that often account for one-quarter or more of the fire deaths in a given area. There are proven programs to improve detector testing by the public and to encourage the high-risk segment of the population to install them.

The growing trend toward local legislation requiring residential sprinklers should be encouraged. Congressman Boucher of Virginia should be congratulated for spearheading the Federal

Fire Safety Act of 1992, which established minimum standards for the installation of automatic sprinklers and smoke detectors in newly constructed or renovated federal office space and federally assisted housing.

The furniture flammability standards that have proven so effective in California could be extended nationally. The CPSC is currently considering a petition to enact federal furniture flammability standards; such standards could be expected to bring upholstered furniture fire deaths and injuries down nationally by 80 percent. As is true of sprinklers, mattress and furniture flammability standards protect against fires from all ignition sources, not simply cigarettes.

Public fire education programs have been chronically underfunded in the United States, even though studies have shown the effectiveness of clear, well-targeted, and often-repeated fire prevention messages. Fire departments typically spend only one to three percent of their budget on fire prevention -- and prevention programs are often the first to be cut in a budget crunch. Devoting more resources to fire prevention would make a tremendous difference in the fire and fire death rate of this nation.

## Why Other Countries Have Better Fire Rates Than the U.S.

I have studied why the United States has a higher fire death rate than most of the rest of the industrialized world. The main reason is not that our products are more dangerous than those of other countries. Rather, we tend to absolve individuals from taking responsibility for their actions. A drunk driver is treated very harshly today, and bears the stigma of his actions. Yet if the drunk driver makes it home safely, and then starts a fatal fire while cooking or smoking, there is virtually no stigma and no penalty at all.

Other countries approach individual responsibility much more seriously, take advantage of existing fire prevention technologies, and generally invest much more in fire prevention than we do in the United States. The low fire death rates in these countries reflect the effectiveness of their approaches. For example:

- The British (with a fire death rate 20 percent lower than that of the U.S.) use effective advertising and market research to develop messages that motivate people to behave safely. The British also outspend the United States 5 to 1 at the national level on public fire education, measured on a per capita basis. They run fire safety public service announcements during prime time on television and repeat the messages often. The British also enforce very strict mandatory furniture flammability standards.

- The Dutch (with a fire death rate one-fifth that of the U.S.) require their homes to be built with compartmentation, multiple ways out of each room, and fire-rated doors and walls, in addition to promoting national pride in good housekeeping and carefulness around the house.
- New Zealanders (with a fire death rate 40 percent lower than that of the U.S.) promote a fire safety campaign whose theme is: "Furniture doesn't cause fires. You do."
- In Austria (with a fire death rate one-third that of the U.S.), great social pressure is put on parents to monitor their children. Austrians look with disapproval upon any family whose children start fires.
- The Japanese (with a fire death rate 40 percent lower than that of the U.S.), rely very heavily on public fire safety education, and will go as far as to pressure someone responsible for starting a fire to move out of the neighborhood, because that person has endangered the entire neighborhood with his carelessness.

Many of these practices of other nations can and have been made to work with Americans. The U.S. military, especially the Navy, does not tolerate careless fire behavior among enlisted service members or their dependents in base housing. The Navy achieves the same or lower fire death rates as do the foreign nations listed above.

## Government Should Focus on Proven Methods of Preventing Fire

The reservations expressed by the CPSC in its August 1993 report to Congress about whether a cigarette fire safety standard "will effectively address the number of cigarette ignited fires," including concerns about the potential health effects of modified cigarettes, must not be ignored. Until the uncertainties expressed by the CPSC and others about whether a cigarette fire safety performance standard will have a net positive effect are addressed and removed, we should focus on the approaches that we know make a difference.

# TRENDS IN SMOKING MATERIALS FIRES:
# 1993 UPDATE

## EXECUTIVE SUMMARY

This report updates by two years our previous report on trends in smoking-material-related fires. Fire deaths where smoking materials were reported as the source of ignition decreased by 45 percent from 1980 to 1991. (The drop continued sharply downward in the latest two years, going from 36 percent to 45 percent.) Structural fires where smoking materials are the ignition source dropped by well over half (58 percent.) The latest year, 1991, had about 940 deaths involving smoking materials, down from 1,982 in 1980. The decrease in careless smoking fires is much greater than the decline in smoking over the decade and is more pronounced than almost any other trend in major fire statistics.

## APPROACH

In 1990, the National Fire Protection Association (NFPA) published a report entitled "The U.S. Smoking Material Fire Problem Through 1988." [1] The present TriData report extends the NFPA analysis through 1991. The 1990-1991 period showed continuation of the strong downward trend in smoking materials fires and fire deaths previously noted for 1980-1988.

Following NFPA definitions, "smoking materials" includes cigarettes, cigars and pipes. The use of "smoking materials" here makes the analysis directly comparable to the NFPA report -- with more recent data added. We follow the standard usages by

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[1] Alison L. Miller, "The U.S. Smoking-Material Fire Problem Through 1988: The Role of Lighted Tobacco Products in Fire," National Fire Protection Association, November 1990.

NFPA and the United States Fire Administration (USFA), which do not include matches or lighters in "smoking materials" fires.

## METHODOLOGY

Estimates of the magnitude and trends in smoking materials fires are made in essentially the same way by the Consumer Product Safety Commission, NFPA, the United States Fire Administration and TriData. This is not accidental; the analysts concerned have reached a consensus on the best approach to the available data. That approach is to get an estimate of the percentage of the fire problem attributable to smoking materials from the National Fire Incident Reporting System, and multiply it by the total number of estimated fires (or fire deaths or injuries) to define the number of fires, deaths, injuries, etc. related to smoking materials. The need for using two data sources arises from the difficulty in scaling up data from the National Fire Incident Reporting System; participating fire departments do not all provide information on the population protected, and hence their fire data cannot be scaled up to provide national estimates. On the other hand, the NFPA annual survey, the source of NFPA's estimate of total fires, deaths, injuries and dollar loss, does not have a detailed cause breakdown. Thus, the two sources, NFPA and NFIRS, are used together.

Changes in any particular aspect of the fire problem such as smoking materials fires are a combination of a change in the estimate of total fires (or deaths), and a change in the estimate of the percent of fires (or fire deaths) attributed to that cause; i.e., smoking materials. Over the 1980s and early 1990s both the total number of fires and fire deaths decreased, and the percent of the problem attributable to smoking-related materials decreased. *The estimated decrease in smoking materials-related fires and fire deaths continues to be due not only to a drop in the overall totals of fires and fire deaths but also a drop in the proportion of the problem attributable to smoking materials (from 35 percent of fire deaths in 1980 to 25 percent in 1991.)*

One further point about methodology: all analyses of the fire problem must take into account the fact that the fire service does not report the cause of a significant percentage of fires and fire deaths. For fire deaths, this percentage has tended to be very large – 25 to 30 percent. Most analysts, including TriData, frequently make the assumption that the unknown fires are distributed like the known fires. This may in fact be the case, or there may be some bias in the unknowns. (Some fire officials believe that a disproportionate share of those reported as unknown are incendiary or suspicious fires.) In the absence of specific information, we follow in this report the convention of computing the percent of fires attributable to smoking materials using the known-cause fires as the base. This increases the proportion of fires attributable to smoking materials compared to just using the raw percentage and not adjusting for the unknowns. There also would be year-to-year changes attributable to fluctuations in the degree to which causes are reported. We have chosen the method consistent with most other analysts here.

## RESULTS

***Fires*** – Figure 1 shows that smoking materials-related structure fires declined by more than 58 percent from 1980 to 1991.[2] (The drop is the same whether one looks at the trend line or the actual end point years.) In other words, there were fewer than half as many smoking materials-related structure fires in 1991 (43,500) than there were in 1980 (104,300)[3].

Figure 2 shows the trend over 1980-1991 in terms of fires per million people. Because one expects more fires from more people, comparisons over time and comparisons between states and nations are usually made on a per capita basis. From 1980 to 1991 smoking materials-related fires per capita decreased by 63 percent (459 per million people to 172 per million). *This is a very rapid sustained drop of almost 5 percent per year.*

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[2] Increases and decreases were computed using more significant figures after the decimal point than appears on the printed charts. Computations based on the recorded numbers on the charts will give slightly different results because of round-off errors.

[3] In Figure 1 and other figures in this report, the raw data is plotted along with a best-fit trend line. The figures also contain a table of the data used.

***Fire Deaths*** -- Smoking materials-related fire deaths also decreased significantly during the decade, dropping from an estimated 1,982 in 1980 to 940 in 1991, a drop of over 1,000 deaths, or 53 percent. (Figure 3). This is the first time smoking-related fire deaths dropped below 1,000. The expanded set of data makes the downward trend more clearly pronounced than our previous report. Note that 1988 and 1981 were anomalous years with large deviations from the trend.

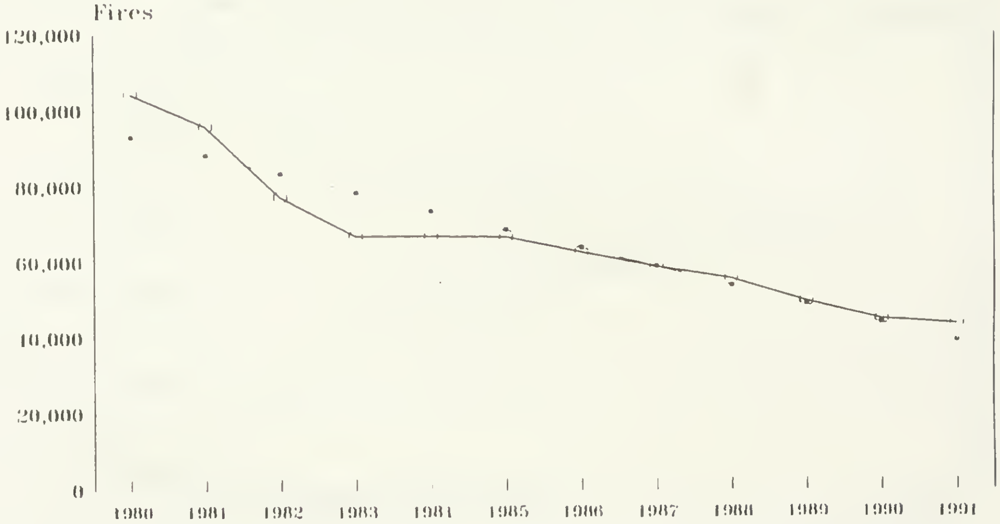
1991 fire deaths were sharply lower than in 1990, by 300 deaths or 25 percent. The drop in the trend from 1980 to 1991 was 45 percent.

Figure 4 shows the decline in the percent of fire deaths involving smoking materials. In 1980 smoking materials accounted for 35 percent of fire deaths; by 1989 that had dropped to 25 percent. This is a significant change in the nature of the fire problem.

Figure 5 shows that smoking materials-related fire deaths *per capita* decreased even more than did the absolute numbers of deaths. As can be seen, the drop from 1980 to 1991 was huge, from 8.7 per million to 3.7 per million, 57 percent. The trend line dropped 51 percent.

Figure 1

Smoking Materials-Related Structure Fires

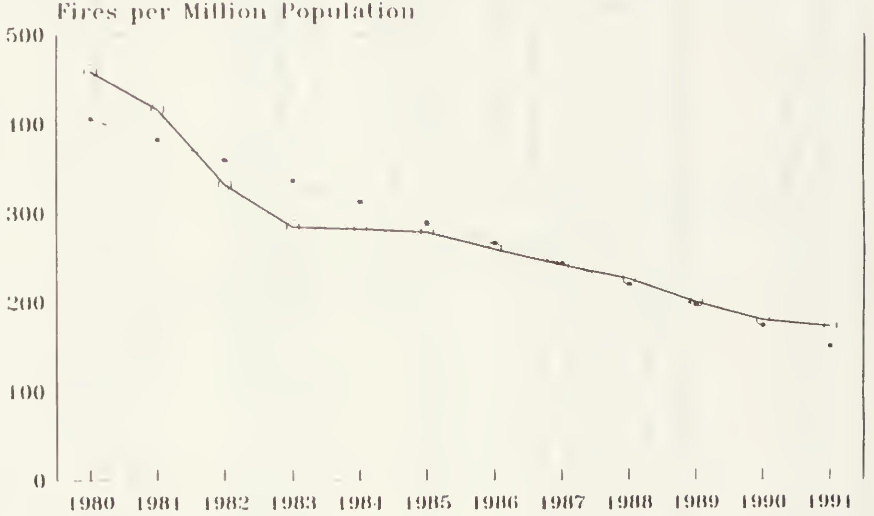


| | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Fires —+— | 104,300 | 95,700 | 77,100 | 66,700 | 68,700 | 66,500 | 62,500 | 58,700 | 55,600 | 49,600 | 44,800 | 43,500 |
| Trend • | 92,954 | 88,049 | 83,143 | 78,238 | 73,333 | 68,428 | 63,522 | 58,617 | 53,712 | 48,807 | 43,901 | 38,996 |

There was a 58 percent drop in these fires since 1980.

## Figure 2

## Smoking Materials-Related Structure Fires per Million Population

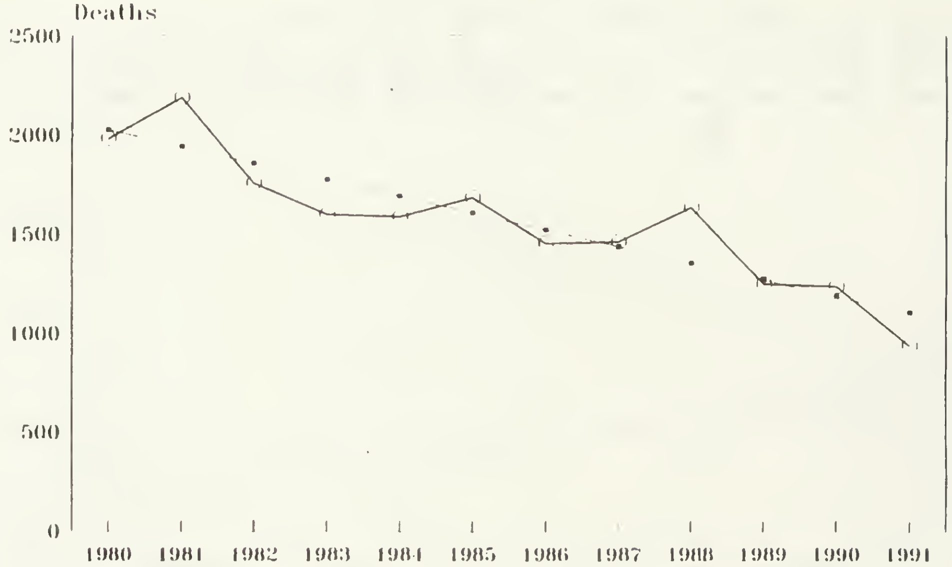


| | | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Fires/Million | —+— | 459 | 417 | 332 | 285 | 282 | 279 | 259 | 244 | 226 | 200 | 179 | 172 |
| Trend | • | 406 | 382 | 359 | 336 | 312 | 289 | 266 | 243 | 219 | 196 | 173 | 150 |

There was a 63 percent drop in the per capita fire rate since 1980.

## Figure 3

## Smoking Materials–Related Fire Deaths

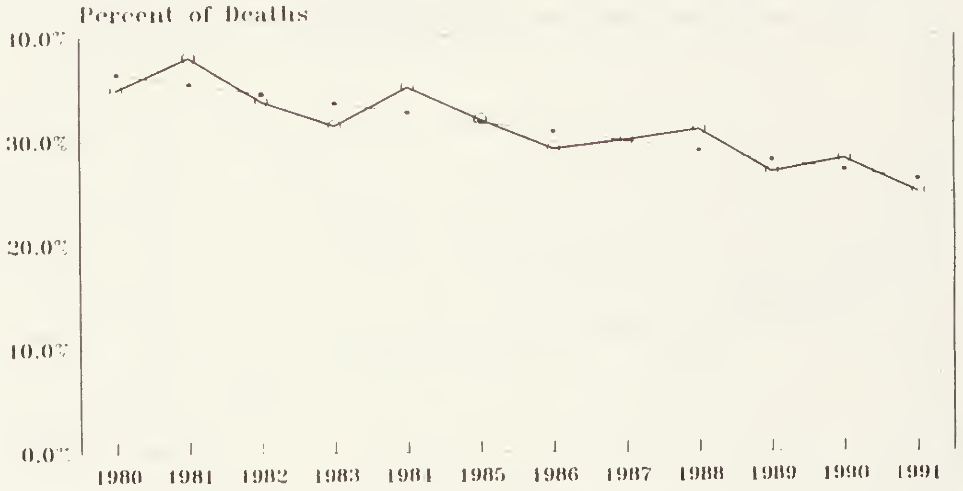


| | | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Deaths | —+— | 1982 | 2188 | 1757 | 1600 | 1589 | 1685 | 1451 | 1463 | 1637 | 1253 | 1240 | 910 |
| Trend | • | 2026 | 1942 | 1859 | 1775 | 1691 | 1608 | 1524 | 1440 | 1356 | 1273 | 1189 | 1105 |

These fire deaths have trended down 15 percent since 1980.

## Figure 4

## Percent of Fire Deaths Attributed to Smoking Materials

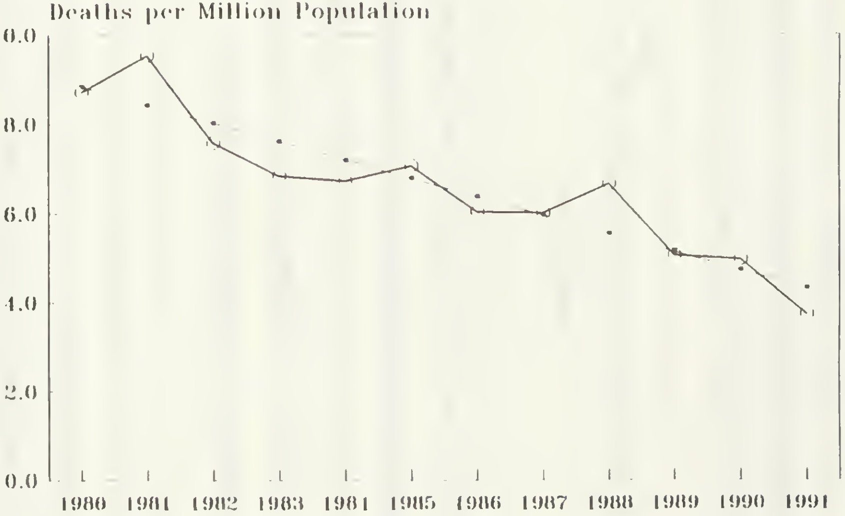


| | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Deaths —+— | 34.9% | 38.0% | 33.8% | 31.4% | 35.1% | 32.0% | 29.2% | 30.0% | 31.0% | 26.9% | 28.2% | 25.0% |
| Trend • | 36.4% | 35.5% | 34.5% | 33.6% | 32.7% | 31.8% | 30.8% | 29.9% | 29.0% | 28.0% | 27.1% | 26.2% |

The fraction of fire deaths attributed to smoking materials dropped from 35 percent to 25 percent since 1980.

## Figure 5

## Smoking Materials–Related Fire Deaths per Million Population



| | | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Deaths/Million | —+— | 8.7 | 9.5 | 7.6 | 6.8 | 6.7 | 7.1 | 6.0 | 6.0 | 6.7 | 5.0 | 5.0 | 3.7 |
| Trend | • | 8.8 | 8.4 | 8.0 | 7.6 | 7.2 | 6.8 | 6.4 | 6.0 | 5.5 | 5.1 | 4.7 | 4.3 |

The death rate per capita has trended down 51 percent since 1980.

# STATEMENT OF THE UPHOLSTERED FURNITURE ACTION COUNCIL
# (UFAC)

## SUBMITTED TO THE SUBCOMMITTEE ON COMMERCE, CONSUMER PROTECTION, AND COMPETITIVENESS

## H.R. 3885, THE FIRE SAFE CIGARETTE ACT OF 1994

April 20, 1994

Madam Chairwoman, the Upholstered Furniture Action Council strongly supports H.R. 3885, The Fire Safe Cigarette Act of 1994. Additionally, we would like to commend the good work of Congressman Joe Moakley who has been a leader in this important consumer safety issue. We would also wish to thank you, Chairwoman Collins, and the other members of the Subcommittee for allowing us to submit this statement for the record.

For years America's upholstered furniture industry--manufacturers, retailers and suppliers--have repeatedly urged the tobacco industry to reduce the ignition propensity of cigarettes on a voluntary basis. And today, we do so again. Frankly, based on the success our industry has had with voluntary industry programs, we would prefer that the tobacco industry take responsible action in this area rather than having to be forced to do so under the law. Again, as we have in the past, our industry stands ready to assist the tobacco industry in every way possible to achieve that objective.

Since 1973, all elements of the American furniture industry have been represented in administering the Upholstered Furniture Action Council (UFAC), a voluntary upholstered furniture flammability program. UFAC began when furniture manufacturers, retailers and suppliers joined together for the purpose of addressing the cigarette ignition of upholstered furniture. It is an ongoing industry-wide product safety program that is cost-effective and retains consumer choice of fabrics. Implementation of the UFAC program began in 1978.

Today, more than 90% of the dollar volume of U.S. manufactured upholstered furniture is pledged to be in compliance with this voluntary industry program. At this time, American retail companies having a total of over six billion dollars in furniture sales pledge to sell only UFAC complying upholstered furniture. Suppliers work to research, develop and produce furniture components that meet UFAC safety criteria. A UFAC Consumer Education Program and the UFAC Hangtag promote smoke detectors, warn consumers of the possible hazard of careless smoking, and encourage the purchase of "safer" UFAC tagged furniture.

UFAC's success has grown internationally. There has been a UFAC Canada since 1986; a new European Community UFAC called EUFAC has just been announced; and discussions with Mexico are in progress.

Recent statistics from the National Fire Protection Association, the U.S. Fire Administration and the U.S. Consumer Product Safety Commission report a 69.6% reduction in upholstered furniture fires started by smoking materials from 1978 to 1991. Fire deaths during the same period have declined 63.8%.

It is important to note that even with significant decreases in both fires and deaths, the percentage of ignitions by lighted cigarettes did not decrease as much as the decrease in both fires and deaths. The cigarette remains the primary cause of fires in upholstered furniture. **To illustrate, again using data from the above referenced sources, the percent reduction of fires caused by smoking materials for that same period--1978 through 1991--is only 13.9%. This is not surprising since little or nothing has been done to change the ignition propensity of smoking materials.** Nonetheless, the UFAC voluntary program correctly targets its efforts on the issue of cigarette ignition of residential upholstered furniture and continues its efforts to develop construction criteria that will make upholstered furniture product more resistant to cigarette ignition on a cost effective basis. And Chairman Brown of the U.S Consumer Product Safety Commission recently indicated that the upholstered furniture industry had made a significant contribution in reducing residential fires.

Some have attempted to point to upholstered furniture's fabric as the problem. They have recommended washing the fabric for the purpose of eliminating naturally occurring metal ions and salts as a solution to the upholstered furniture flammability problem. The American

Textile Manufacturers Institute (ATMI)[1] and others have clearly shown that washing to remove such ions and salts is not a viable approach to reducing the ignition characteristics of upholstery fabrics. Not only does washing such fabrics cause them to lose their aesthetic qualities in most instances -- but washing is not a permanent solution. With normal use in a household, the metal ions/salts from body sebum, perspiration, humidity, and dust - not to mention spills - would be re-absorbed in any such upholstery fabric that had been rinsed in a relatively short time. In addition, unless distilled, deionized water was used, the water itself would reintroduce metal ions/salts back into such fabric.

Chairman Moakley's bill correctly addresses the fact that cigarette ignition remains the primary cause of residential fires that start in upholstered furniture and confirms the need for a program that focuses on minimizing the risk of fire from smoldering cigarettes. Certainly, upholstered furniture itself does not present an unreasonable risk of injury.

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[1] Roger Berkley, Textile Chemist and Colorist, Vol. 25, No. 5, May 1993, p. 18.

U.S. CONSUMER PRODUCT SAFETY COMMISSION
WASHINGTON, D.C. 20207

Commissioner

April 12, 1994

The Honorable Cardiss Collins
Chairwoman
Subcommittee on Commerce,
Consumer Protection, and Competitiveness
Committee on Energy and Commerce
U.S. House of Representatives
Washington, D.C. 20515-6120

Dear Chairwoman Collins:

As Chairman of the Consumer Product Safety Commission (CPSC) during the conduct and adoption of the report on the *Practicability of Developing a Performance Standard to Reduce Cigarette Ignition Propensity*, I feel obliged to provide to your subcommittee my personal views on H.R. 3885, a bill to direct CPSC to promulgate fire safety standards for cigarettes. I request that you include these comments in the subcommittee's hearing record on H.R. 3885.

I share the Congressional desire to reduce residential fires. To this end, the CPSC has worked in several product areas -- smoke detectors, heat tapes, electric heaters, and coffee makers to name just a few. This past summer the Commission issued a standard for child resistant cigarette lighters that has the potential to save more lives than any standard in the agency's history.

Let there be no question, I support making cigarettes less likely to cause fires. Nevertheless, I said to Congress when the report was submitted in August 1993 that I am not personally comfortable designating CPSC as the lead agency to carry out the task of developing standards for fire safe cigarettes. This is still my view.

With this in mind and in the face of Congress mandating the assignment to CPSC, I feel compelled to voice my one major concern. The issue of toxicity of fire safe cigarettes must be addressed. It is recognized that cigarettes are products that pose several health and safety risks, fire being one. In the name of fire safety, we cannot foster the development of cigarettes that may cause more adverse health effects than those already on the market.

The Commission's final report stated *"The Commission emphasizes the importance of including toxicity tests in a standard, since even a small increase in toxicity could outweigh the beneficial effect of fewer fires."* It should be noted that the toxicity of most of the chemicals produced by current cigarettes is known, but it may be quite difficult to determine quantitatively the toxicity of a complex mixture of such chemicals that are found in smoke. Cigarettes are now tested for tar, nicotine, and carbon monoxide It is commonly accepted that further testing beyond these parameters is needed to evaluate toxicity.

During the project, a panel of smoke toxicity experts developed a plan for toxicity testing of cigarettes. It was estimated that it would cost about $330,000 to conduct the full series of toxicity tests on a single type of cigarette. However, the panel did not define acceptable levels of performance for these tests. Such definition was judged to be beyond the direction given by the enabling legislation. It was also believed to be an extremely complex and controversial undertaking, and might not even be possible at the current state of the art. As noted above, it may be quite difficult, given the current state of the art, to determine quantitatively the toxicity of any cigarette. It was noted that improvements in toxicity testing and risk evaluation may occur in the future and should be considered during possible revisions of the plan.

The Commission staff, working with the expert panel, recommended a reduced number of toxicity tests as a practical first implementation step. These reduced tests were estimated to cost about $6,900 per cigarette type. Five cigarette types, including two prototype ignition-resistant cigarettes, were tested according to the reduced toxicity protocol. The results demonstrated the practicality of the approach and that the tests can distinguish differences among cigarette types.

Any performance test for cigarette ignitability must be paired with a corresponding assurance of no increased adverse health effects. The Commission staff has identified one approach to consider. The proposal, involving the Department of Health and Human Services, the National Voluntary Laboratory Accreditation Program and charging the industry user fees, is outlined in Chairman Brown's testimony. I support this plan or one along similar lines.

In closing it is important to note that, although Chairman Brown and I fundamentally disagree on whether CPSC should be the lead agency to develop standards for fire safe cigarettes, we do agree on the toxicity issue and other factors that Congress should consider as detailed in her testimony.

Thank you for consideration of my views and your continued interest in consumer product safety.

Sincerely,

Jacqueline Jones-Smith

U.S. CONSUMER PRODUCT SAFETY COMMISSION
WASHINGTON, D.C. 20207

April 15, 1994

VIA FACSIMILE

The Honorable Cardiss Collins
Chairwoman
Subcommittee on Commerce, Consumer Protection,
and Competitiveness
Committee on Energy and Commerce
U.S. House of Representatives
Washington, D.C. 20515-6120

Dear Representative Collins:

I appreciate the opportunity to offer my thoughts on H.R. 3885, The Fire Safe Cigarette Act of 1994, and ask that you include these comments in the hearing record.

Each year thousands of Americans die from or are injured by cigarette-ignited fires. Sadly, many of these victims are children who did not have to die nor get hurt. These incidents could have been avoided if parents and other smokers acted responsibly. This legislation attempts to address these tragedies by directing the Consumer Product Safety Commission to promulgate fire safety standards for cigarettes.

As the mother of a child who was severely burned as an infant, I understand better than most the concerns driving Congressman Moakley's bill. I support his efforts. In my own home and in my volunteer work with young burn patients, I have seen the physical and emotional pain that changes their lives forever. I have listened to their dreams of one day being able to perform day-to-day activities that most of us take for granted -- swinging a baseball bat, picking up a fork, or tying a shoe. And, I have seen these children face their challenges with a courage and inner strength that many adults will never know.

My concern is that this legislation does not go far enough. A fire-safe cigarette is not a safe cigarette. The dangers of cigarettes, both to the user and to non-smokers, are well-documented. While it is certainly important to address the issue of fire safety, I believe that the Congress and the Federal Government must develop and implement a broad-based unified plan to combat the toxic effects of smoking. Until then, our message must be loud and clear: endangering the lives of others through smoking cannot be tolerated. This is especially true for the protection of our children. Parents must not allow smoking in the home, in the car or in any other area where children are nearby.

The American Cancer Society says that tobacco use is responsible for nearly one in five deaths in the U.S. -- about 419,000 deaths annually. Each year, an estimated 3,000 deaths result from exposure to second-hand smoke. The impact on the innocent victims, our children, is alarming. In infants and children under eighteen months, hundreds of thousands of lower respiratory tract infections result from exposure to other people's smoking; thousands of these cases require hospitalization. An additional 200,000 to 1 million asthmatic children develop more serious symptoms as a result of breathing tobacco smoke. Exposure to smoke in unborn children and in infancy can alter both lung function and structure and create other changes that are known to predispose children to long-term pulmonary risks. And the linkage between Sudden Infant Death Syndrome and maternal smoking is well-established. These children are defenseless, unlike the adults who choose to poison themselves by inhaling the roughly 43 different carcinogenic substances in tobacco smoke.

As Congress prepares to debate health care reform, reducing the dangers of tobacco should be a priority initiative. Congressman Moakley's legislation is only a first step. It is imperative that Congress act now to address the total health implications of tobacco toxicity.

Thank you for the opportunity to express my views.

Sincerely,

Mary Sheila Gall

Mary Sheila Gall
Vice Chairman

APPENDIX

UNITED STATES GOVERNMENT

MEMORANDUM

U.S. CONSUMER PRODUCT
SAFETY COMMISSION
WASHINGTON, D.C. 20207

DATE: April 14, 1994

TO: The Honorable Cardiss Collins
Chair, Subcommittee on Commerce, Consumer Protection
and Competitiveness

FROM: Ann Brown, Chairman AB
Consumer Product Safety Commission

SUBJECT: Cigarette Safety Rulemaking Resource Needs

Resources needed to develop the rule is estimated at 7.2 FTEs, $430,000 for related salaries and benefits, and $1,462,500 for contract support, for a total dollar cost of $1,894,000. These costs would be spread over an 18 month period with most of the costs occurring in the first year.

In addition, enforcement of the rule is expected to require a minimum 1.5 FTEs for an annual cost of $90,000. The Commission can absorb these enforcement costs within its regular compliance and enforcement budget.

Table 1
Staff Months Required

| Directorate | Task | Staff Months |
|---|---|---|
| Compliance | address comments | 3 |
| Economics | address comments | 2 |
| Economics | do market update | 2 |
| Economics | address stockpiling | 2 |
| Economics | determine effective date | 1 |
| Engineering | engineering lab support | 5 |
| Engineering | project management | 9 |
| Engineering | administer NIST contract | 6 |
| General Counsel | review staff input | 1 |
| General Counsel | address comments | 1 |
| General Counsel | research | 1 |
| General Counsel | index cited material | 1 |
| General Counsel | draft NPR | 3 |
| General Counsel | draft final rulemaking | 5 |
| Hazard Analysis | address comments | 2 |
| Hazard Analysis | provide statistical support | 2 |
| Hazard Analysis | compile update of incident data | 6 |
| Health Sciences | address comments | 2 |
| Health Sciences | toxicity testing and data review (if needed) | 6 |
| Human Factors | address comments | 2 |
| Public Affairs | public relations activities | 3 |
| Various directorates | unspecified tasks | 7 |
| **Total** | | 72 |

Table 2
Contract Money Required

| Task | Contract Money |
|---|---|
| Determine link between low ignition propensity in laboratory testing and field and test to establish selection of pass-fail criterion (NIST) | $800,000 (12 months) |
| Toxicity testing (Health Sciences) | $500,000 |
| Video news release production (Public Affairs) | $10,000 |
| Video distribution (Public Affairs) | $5,000 |
| News conference (Public Affairs) | $2,000 |
| Satellite media tour with Chairman (Public Affairs) | $10,000 |
| Purchase mailing lists (Public Affairs) | $500 |
| Printing documents (Public Affairs) | $5,000 |
| Unspecified Tasks | $130,000 |
| Total | $1,462,500 |

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U.S. House of Representatives
Committee on Energy and Commerce

SUBCOMMITTEE ON COMMERCE,
CONSUMER PROTECTION, AND COMPETITIVENESS

Washington, DC 20515-6120

April 28, 1994

The Honorable Charles Whitley
Senior Consultant
Tobacco Institute
1875 Eye Street, NW
Suite 800
Washington, DC 20006

Dear Congressman Whitley:

Thank you for testifying at the Subcommittee's recent hearing on H.R. 3885, the Fire Safe Cigarette Act of 1994. Following are questions for the record of the hearing. Please respond and return to the Subcommittee within five business days.

(1) Enclosed is a Reuters article from March 29, 1994 in which Tobacco Institute spokeswoman Brennan Dawson is quoted as opposing regulation of cigarettes by the Food and Drug Administration, arguing "Cigarettes are not a drug. Cigarettes are not sold as a therapy. They are sold as a consumer product." If that is so, why shouldn't cigarettes be regulated by the CPSC, like any other consumer product, at least with respect to the fire hazard?

(2) In your testimony, you referred to the statement in the August 1993 CPSC report indicating that it was "unclear that such a standard will effectively address the number of cigarette-ignited fires". The Fire Safe Cigarette Act of 1990 provided that the final CPSC report was to be submitted by the Chairman of the CPSC, but, despite this statutory instruction, several substantive changes were made to the then-Chairman's report by the other two Commissioners. Correspondence between the Subcommittee and the CPSC confirmed that this phrase was one of those changes. These changes drew a strong protest from then CPSC Chairman Jones-Smith, who complained that the changes "advocate the positions of very special interests" and "undermine the objectivity of the report". Are you aware of any contacts between representatives of the tobacco industry and CPSC Commissioners concerning the wording of the CPSC report? If so, please provide details of these contacts and what was discussed.

Thank you for your cooperation.

Sincerely,

Cardiss Collins

CARDISS COLLINS
Chairwoman

CC:rh
Enclosure

THE TOBACCO INSTITUTE

May 10, 1994

The Honorable
Cardiss Collins
Subcommittee on Commerce, Consumer
Protection and Competitiveness
151 Ford House Office Building
Washington, DC 20515

Dear Madam Chairwoman:

We are pleased to provide you with the following responses to the issues raised in your letter of April 28, 1994.

1. Regulatory Status of Cigarettes

Although some have suggested that cigarettes are virtually unregulated, and that repeal of the tobacco products exemption from the Consumer Product Safety Act is warranted for that reason, the fact is that cigarettes already are subject to a wide variety of regulatory requirements.

Federal regulation of tobacco begins with the setting of production quotas and price levels for tobacco leaf by the Agricultural Stabilization and Conservation Service and the Commodity Credit Corporation of the United States Department of Agriculture ("USDA"). (7 U.S.C. 1281 et seq; 7 U.S.C. 1421 et seq.). In addition, USDA's Agricultural Marketing Service grades tobacco in accordance with federal regulations. (7 C.F.R. Part 29). The USDA, acting in conjunction with the Environmental Protection Agency, also regulates all pesticides that are used on tobacco. (7 U.S.C. 511r; 7 U.S.C. 135 et seq.; 7 C.F.R. 1464.7(b)(2), 1464.8(e)(2)-(3)).

Cigarette labeling and advertising is governed by the Federal Cigarette Labeling and Advertising Act, which bans cigarette advertising on radio and television and requires cigarette packages and advertising to carry specified health warnings, subject to regulatory oversight by the Department of Justice and the Federal Trade Commission ("FTC"). (15 U.S.C. 45 and 1331 et seq.). The Bureau of Alcohol, Tobacco and Firearms regulates still other aspects of cigarette packaging and promotion. (E.g., 27 C.F.R. 295.41-42).

Cigarette ingredients are monitored by the Office on Smoking and Health in the Department of Health and Human Services ("HHS"). (15 U.S.C. 1335a). Cigarette manufacturers are required to submit annually to HHS a complete list of all ingredients added to tobacco in the manufacture of cigarettes, a procedure that "permit[s] the federal government to initiate the toxicological research necessary to measure any health risk posed by the addition of additives and any other ingredients to cigarettes during the manufacturing process." (H.R. Rep. No. 805, 98th Cong., 2d Sess. 21 (1984)). The principal constituents of cigarette smoke are monitored and measured under a voluntary agreement with the FTC, which annually publishes "tar", nicotine and carbon monoxide ratings in the Federal Register.

Notwithstanding recent claims that tobacco is exempt from regulation by the Food and Drug Administration ("FDA"), the FDA has asserted jurisdiction over cigarettes as a "drug" whenever health claims have been asserted by vendors or manufacturers. The courts have sustained FDA's jurisdiction in those circumstances. (E.g., United States v. 354 Bulk Cartons * * * Trim Reducing-Aid Cigarettes, 178 F. Supp. 847 (D.N.J. 1958)). Absent health claims, the FDA's long-standing position has been that cigarettes are not a "drug" within the meaning of the Food, Drug and Cosmetic Act. (Action on Smoking and Health v. Harris, 655 F.2d 236 (D.C. Cir. 1980)). Cigarettes are treated no differently than other products in that regard.

When and where cigarettes can be smoked is subject to extensive and growing regulation at all levels of government -- federal, state and local. The pertinent measures are too numerous to list in this letter. It should be noted, however, that many of the oldest restrictions on smoking were established and are enforced for the specific purpose of providing fire safety protection.

Congress did not include an express exemption for cigarettes when it enacted the Federal Hazardous Substances Act, the predecessor to the Consumer Product Safety Act, in 1960. Congress added a tobacco products exemption in 1976 to clarify and uphold a construction of the Act by the CPSC that it lacked jurisdiction to regulate cigarettes. (15 U.S.C. 1261(f)(2); see also H. Rep. No. 325, 94th Cong., 1st Sess. 16 (1975)). As Senators Hartke, Hollings, Ford, Stevens and Beall explained at that time, the 1976 amendment "reflects the Commission's recognition that its resources should be devoted to the many pressing matters plainly within its jurisdiction * * *." (S. Rep. No. 251, 94th Cong., 1st Sess. 43 (1975). These same concerns led to the rejection on November 18, 1987, by a 9-5 vote of this Subcommittee, of a proposal to repeal the tobacco products exemption from the Consumer Product Safety Act. (See Effects on Consumers of Tobacco Use: Hearing on H.R. 2376, 100th Cong., 1st Sess. 7, 10 (1987)).

Tobacco products are by no means the only products that have been exempted by Congress from regulation by the CPSC. Automobiles, pesticides, firearms, aircraft, boats, drugs, medical devices, cosmetics and food have been similarly exempted. (15 U.S.C. § 2052(a)(1)). In each case, Congress did so for the reason that these products, like tobacco products, already are regulated by other federal agencies or by Congress.

The history of federal activity relating to cigarette ignition propensity confirms Congress's wisdom in maintaining the exemption of tobacco products from the Consumer Product Safety Act. Under the Cigarette Fire Safety Act of 1984 and the Fire Safe Cigarette Act of 1990, extensive studies have been authorized and conducted without repeal of the exemption. The August 1993 Report of the CPSC to Congress makes abundantly clear that further studies are needed to determine whether a cigarette ignition propensity standard would achieve any benefits, whether the costs would outweigh any benefits and whether unintended adverse effects may result. In transmitting its August 1993 Report to Congress, moreover, the CPSC pointedly refrained from recommending that Congress remove the tobacco products exemption from the Consumer Product Safety Act, based in part on the same concerns that have been raised in the past concerning the adequacy of the agency's resources to deal with this complex issue.

### 2. August 1993 Consumer Product Safety Commission Report

You also have asked whether we are aware of any contacts between representatives of the tobacco industry and CPSC Commissioners concerning the wording of the CPSC's August 1993 Report to Congress. It is my understanding that neither the conclusions of the CPSC Report, nor any aspect of the wording of the Report, was disclosed to or discussed with representatives of the tobacco industry prior to the Report's transmittal to Congress.

Representatives of the Cigarette Ignition Propensity Joint Venture, which comprises the six domestic cigarette manufacturers, were given the opportunity to provide a briefing on industry research to each of the Commissioners on

July 26, 1993. The meetings were open to the public and were attended by Dr. Richard Gann of the National Institute of Standards and Technology, representatives of the CPSC Staff and members of the public.

The industry representatives summarized in their presentations to the CPSC Commissioners the results of industry research, including studies in which experimental cigarettes of varying designs were tested on a large number of commercial furniture fabrics. The information summarized in the presentations also was provided to the CPSC as part of the "Report of the Cigarette Ignition Propensity Joint Venture to the Consumer Product Safety Commission," a copy of which I submitted for the record as an attachment to my statement before the Subcommittee. Full technical documentation for these and other industry studies also was submitted to the CPSC. I did not submit a copy of the technical documentation for the record at the April 19 hearing because it comprises approximately 500 pages. We would be pleased, however, to provide a copy on request.

The industry studies described above, as well as research results reported by NIST, provide ample justification for the statement in the August 1993 CPSC Report that "it is unclear that * * * a [cigarette fire safety] standard will effectively address the number of cigarette ignited fires." We would reemphasize here, however, that none of the CPSC Commissioners disclosed to any tobacco industry represent-

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atives prior to submission of the CPSC's August 1993 Report to Congress what conclusions, if any, they had reached or had under consideration, or any aspect of the potential wording of the CPSC Report.

Insofar as your April 28, 1994 letter might be construed as indicating that then-Chairman Jones-Smith disagreed with the conclusions stated above, I would note for the record that the statement released by Chairman Jones-Smith on August 10, 1993 does not take issue with the substance of the Commission's Report. In fact, Chairman Jones-Smith's executive assistant was quoted shortly after issuance of the Report as saying that "[i]t's more a matter of process rather than [an] issue with regard to the report * * *. In fact, she may even agree [with the Report] * * *." (BNA Product Safety & Liability Reporter, August 13, 1993, p. 855).

Apart from the reservation expressed in the CPSC Report concerning the overall effectiveness of a cigarette fire safety standard, the Report contains a number of other important observations, including the following:

- Neither the benefits nor the costs of a cigarette ignition propensity standard have been determined and "would depend upon the nature, technical and commercial feasibility and projected effectiveness of any possible requirements" (Report, p. 21);
- "[N]ot all smoking fires are addressable by widespread use of lower ignition propensity cigarettes. Therefore, the * * * estimates [that have been made] may overstate the

likely level of benefits of mandatory or other action to reduce cigarette ignition propensity" (id. at 22);

- "[A]dditional tests of the kind carried out by the tobacco industry would be necessary to make the cost/benefit findings that might be required to promulgate a standard" (id. at 29);
- [U]ncertainty about the commercial feasibility of lower ignition propensity cigarettes remains" (id. at 21); and
- Extensive study of the potential health implications of any government-mandated modification in cigarettes intended to reduce the risk of fire is essential "since even a small increase in toxicity would outweigh the beneficial effects of fewer fires" (id. at vii).

In short, independent of any internal issue among the Commissioners concerning the drafting of the CPSC Report, the fact remains that critical concerns have been raised at a number of points throughout the Report. Unfortunately, H.R. 3885 does not take those concerns into account. In fact, H.R. 3885 would require the issuance of a cigarette ignition propensity standard even if the further studies called for by the CPSC Report indicate that such a standard would be ineffective or even counterproductive.

Sincerely,

Charles O. Whitley
Senior Consultant

COW/sr

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